



# Tasman District Council Forests

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Owned by  
**TASMAN DISTRICT COUNCIL**

**Forest Management Plan**

For the period 2014 / 2019



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## 1. Introduction

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### **Principles and Criteria**

Tasman District Council (Council) is committed to adopt the Forest Stewardship Council (FSC) Principles and to meet their Criteria and the FSC standards of good forest management. These standards include ecological, social and economic parameters.

Tasman District Council is a resource member of the FSC Group Scheme that is implemented through the PF Olsen Group Scheme Member Manual and associated documents.

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### **About this Plan**

This document provides a summary of the forest management plan and contains:

- Management objectives;
  - A description of the land and forest resources;
  - Environmental safeguards;
  - Identification and protection of rare, threatened and endangered species;
  - Rationale for species selection, management regime and harvest plan and techniques to be used;
  - Appropriate management of unstocked reserve areas;
  - Maps showing plantation area, legal boundaries and protected areas;
  - Provisions for monitoring and protection.
- 

### **Integrating Management**

Council has previously managed its forests under the guidance of a 5 year (plantation) management plan including approval specifically for the Rabbit Island plantations by the Ministry of Primary Industries. That plan more specifically details the harvesting, restocking, silvicultural and forest health and other operational management programmes over 5 year periods.

This planning document seeks to integrate much of that plans information into this document. The more specific operational management details of the plantation management plan are included in Appendix 1.

As part of its own planning process in relation to the plantation stands Council set specific policy objectives that they sought from or to guide the management of the commercial plantation estate. These are listed below.

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**Forest Management**

**Policy**

*An independent Forest Manager shall be employed and shall be responsible for forestry and harvesting/marketing management.  
(This policy is under review - Enterprises Committer decision 6-5-09. Other clauses relating to the conditions of the contract have yet to be confirmed and will be incorporated into this document when available.)*

**Resource Size**

**Policy**

*That Council maintains its current resource size and only purchase additional acquisitions of land or forest where these make practical and economic sense.*

**Species Choice**

**Current Policy**

*Council spread the risk of its forest resource through various means including a mix of species, with up to 15% by area of species other than Radiata pine.*

**Silviculture Regimes**

**Policy**

*As part of the Council's risk management a variety of forest tending regimes should continue to be practised for increased timber marketing flexibility.*

*Radiata pine will be the predominant species and where economics justify, be intensively tended for the production of clearwood with a rotation age of 30 years.*

*On other sites, Radiata pine will be managed for the production of small branched framing grade logs with a rotation age of 27 years.*

*Douglas fir will be managed for the production of small branched, large diameter unpruned sawlogs with a minimum rotation age of 45 years.*

**Forest Health & Protection**

**Policy**

*All practical steps are to be taken by the Forest Managers to maintain tree health, to protect the forest from fire or any other threat, and to maintain or enhance soil fertility.*

**Estate modelling and cutting plans**

**Policy**

*The forest estate will be managed on a sustained yield basis, with the aim of similar timber volumes to be harvested each year in perpetuity.*

**Public access**

**Policy**

*Where practical and safe, public access and use of forests will be encouraged. To maintain control over usage, public entry into the forest areas is by permit and with appropriate insurance if deemed by the forest manager to be necessary.*

(This policy is under review - Enterprises Committee decision 6-5-09. Any amendments will be incorporated into this document when available.)

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**Log marketing**

**Policy**

*Graded log sales by negotiated contract be the predominant sales method, but flexibility should be available to the Forest Manager to achieve maximum net returns. This could include tendering, or stumpage sales.*

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**Reserve  
management plan**

In response to the demands and to meet legislative requirements under the Reserves Act a Rabbit Island Reserves Management Plan has been produced and periodically updated since 1989 (Appendix 2).

This plan lays out management objectives to achieve the purposes under which the island reserve was originally vested to the territorial authority by Order in Council. The Management objectives include managing for;

- Coastal erosion
- Public recreation
- Conservation of natural and cultural features
- The forest plantations – as a tool for wind erosion control and a sustainable yield.
- Integration of site use options between the recreation/domain and reserve areas and the plantation areas.
- Provision of opportunity for events and equestrian areas.

This current management planning document seeks to recognise and provide for the requirements of the Rabbit Island Reserves Management Plan.

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## 2. Forest Investment Objectives

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**Provision of services**

Tasman District Council’s objective is to obtain an economic return on investment while providing environmental benefits, including:

- Enhanced water quality;
  - Soil, stabilisation and conservation;
  - Providing a buffer against flooding during storms;
  - Shading waterways for aquatic life;
  - Enhance wildlife and plant habitat leading to increased biodiversity;
  - A reduction in greenhouse gases;
  - Economic and social benefits to the community and Tasman District Council.
- 

**Forest management goals**

The forests are managed to:

- Grow trees and produce logs for the manufacturing of different wood products in New Zealand and overseas with a focus on describe primary products;
- Ensure that the productivity of the land does not decline;
- Ensure that environmental values are identified and maintained;
- Ensure that historic sites are identified and protected;
- Ensure that other forest values and products are identified, protected and where possible enhanced;
- Harvest the trees as close as possible to their economic optimum age; and
- Replant following harvesting.

These objectives are delivered via the Quality Management System implemented by PF Olsen that includes ISO 9001 and ISO 14001 certification, and FSC environmental certification (when requested by the customer).

All activities within Council forests are subject to management within a framework set by PF Olsen’s environmental policies and Environmental Management System (EMS).

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**Environmental  
policy**

**PF Olsen Limited Environmental Policy:**

*PF Olsen Ltd is committed to:*

- Sustainable forest and land management;
- Promoting high environmental performance standards that recognise the input from the community in which we operate;
- Where appropriate applying the Principles and Criteria of the Forest Stewardship Council across forest management.

Substantial additional detailed policies are contained within PF Olsen’s Environmental Management System (EMS).

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**EMS framework**

The EMS is a core document defining the policies, processes and procedures that govern the physical implementation of forest management activities. The EMS applies a systematic approach certified to ISO 14001 standards to ensure that prevention of adverse and harmful impacts is effective.

An Environmental Management Group (EMG) assists the Environmental Manager, who is responsible for ensuring that the EMS is maintained and implemented. Internal audits to ensure compliance with the EMS and to improve the procedures of the EMS are undertaken at least once every two years.

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### 3. Forest Landscape Description

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**Overview**

This section describes the physical and legal attributes of the land on which the forest is located. Included in this section are discussions of:

- Location and access;
  - Topography;
  - Soils;
  - Climate;
  - Legal ownership and tenure.
- 

**Location and access**

The Tasman District Council (Council) has forests at six different locations in the Nelson Region. The small Eves Valley forest, also part of the Council forest estate, is excluded from coverage under this Plan as its primary purpose is to complement the Eves Valley landfill operations.

**Rabbit Island** is located approximately 11km by road west of Richmond off State Highway 60.

**Borlase** is located approximately 45km south-west of Richmond. The main access is located off SH6.

**Tunnicliff** is located approximately 21km south of Richmond. The main access is located off SH6.

**Kingsland** is located off Hill Street, Richmond at the southern end of Harts Road on the Richmond Hills, approximately 4km from central Richmond.

**Sherry River** is located in the Sherry River Valley approximately 15km south-west of Tapawera and 60km south of Richmond.

**Howard** is located approximately 110km by road south-west of Richmond off SH 63. It is located on the true right hand side of the Howard River.

All forests have a good network of roads and tracks although in some cases substantial upgrades will be required at time of harvest.

The location of the forests in relation to Port Nelson is listed in the table below and shown in Map 1. Major log processing facilities are located within 25km of the Port.

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**Table 1: Distances from forest to log markets**

<b>Forest</b>	<b>Distance from Port (km)</b>
Rabbit Island	25
Borlase	60
Tunnickliff	35
Kingsland	20
Sherry River	75
Howard	105

**Topography**

**Rabbit Island**

The topography is predominantly flat with some rolling sand dunes. All harvesting is using ground based systems. The altitude ranges from 0 to 10 metres above sea level.

**Borlase**

Rolling to steep hill country. Slopes range from 10 to 25 degrees. Harvesting is suited to mainly hauler based systems.

**Tunnickliff**

Rolling to moderately steep hill country. Slopes range from 10 to 25 degrees. Harvesting is suited to a mix of ground based and hauler systems.

**Kingsland**

Slopes are steep ranging from 20 to above 45 degrees. Harvesting is suited to hauler based systems.

**Sherry River**

Rolling to moderately steep hill country with large areas of flat river terraces. Harvesting is suited to a mix of ground based and hauler systems.

**Howard**

Strongly rolling to moderately steep dissected terraces. Slopes are short and range from 20 to 35 degrees with large areas of flat terraces. Harvesting is suited to a mix of ground based and hauler systems.

**Soils and geology**

The Council forests occupy a wide range of soil types and geology. In general these are well suited to plantation forestry and impose few constraints for tree growth. Occasionally the addition of fertiliser is required to elevate levels of boron, phosphate and nitrogen.

Erosion risk is generally low-moderate and there are few environmental risks associated with roading and harvesting when industry best practice is applied. Soils are mostly stable however when soil conditions are wet windthrow can occur in combination with strong winds.

The NZ Land Resource Inventory classifies the entire area into the following units:

**Table 2: Soil types within the forest estate**

<b>Borlase</b>	<b>Vlle 11</b>	
	Geology:	Moutere and Old Man gravels from weathered greywacke and granites
	Soil (general):	Hill soils, related to yellow grey earths
	Erosion:	Slight sheet; gully and soil slip erosion
	Nutrient Status:	Low
<b>Howard</b>	<b>Vle 25</b>	
	Geology:	Uncemented gravels and conglomerate
	Soil (general):	Hill soils related to lowland yellow-brown earths
	Soils (specific):	Howard silt and clay loams (rolling lands) Howard clay hill soils Kawatiri silt top stone hill soils
	Erosion:	Slight sheet and soil slip erosion
	Nutrient Status:	Low
<b>Kingsland</b>	<b>Vlle 3</b>	
	Geology:	Maroon and grey banded argillite
	Soil (general):	Steepland soils related to lowland yellow-brown earths
	Soils (specific):	Whangamoia steepland silt loams and stony loams
	Erosion:	Sheet and scree erosion
Nutrient Status:	Low to medium	

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<b>Rabbit Island</b>	<b>Vle 24</b>	
	Geology:	Beach gravels and dune sands from greywacke & granite
	Soil (general):	Yellow-brown sand
	Soils (specific):	Tahunanui sand and fine sand
	Erosion:	Slight to moderate wind erosion
	Nutrient Status:	Low
<b>Sherry River</b>	<b>Floodplains IIIs2 &amp; IVs3</b>	
	Geology:	Uncemented gravel
	Soils:	Sherry sand and Sandy loam. Formed on granite alluvium
	Erosion:	Potential for slight stream bank erosion
	Nutrient Status:	Fertility is very low and soil has very low levels of potassium, phosphorous and calcium. Soils are very acid and deficiencies in boron may occur
	<b>Sandstones and Mudstones Vlle4, Vle6 &amp; Vle18</b>	
	Geology:	Soft sandstone and mudstone
	Soils:	Tadmor Hill soils. Formed on siltstone and sandstone on moderately steep hills
	Erosion:	Potential for slight soil slip and sheet erosion
	Nutrient Status:	Topsoils are generally shallow
	<b>Granite Formations Vlle25, IVs13 &amp; Vle21</b>	
	Geology:	Coarse crystalline rock
	Soils:	Glenhope steepland soils and Kaiteriteri sandy loam. Found on very steep slopes or gently sloping country and formed on deeply weathered granite
	Erosion:	Potential for slight soil slop and sheet erosion
	Nutrient Status:	These soils are formed under high rainfall and have very low fertility
<b>Tunnickliff</b>	<b>Vle 16</b>	
	Geology:	Deeply weathered greywacke gravels, overlying lignite and clay
	Soil (general):	Hill soils related to yellow-grey earths or yellow-grey to yellow-brown earth intergrade
	Soils (specific):	Spooner Hill silt loams and stony loams
	Erosion:	Slight sheet and soil slip erosion
	Nutrient Status:	Low

**Climate**

The climate of the Nelson region is moderate with cool winters. Summer droughts can occur and occasional sub-tropical origin storms can bring periods of intense rainfall and strong winds. Overall Nelson enjoys one of New Zealand’s most pleasant climates with high sunshine hours and is ideal for tree growing with few extremes.

The mean annual temperature, measured at Nelson airport is 12.1 degrees, with 89 days of ground frost per year. Wakefield, the epicentre of Council’s forests, receives around 1200 mm per year of rainfall.

The forests closest to the coast receive around 920 mm rain per year while the Howard receives the highest rainfall of about 1500 mm per year.

Highest rainfalls for all forests occur during September-October and the lowest rainfalls in January-February. In general rainfall is relatively evenly distributed throughout the year and is adequate for good tree growth although occasional low summer rainfalls limit tree growth during this period.

**Legal ownership**

The tenure of all land is freehold with the exception of Rabbit Island which was vested by the Crown by Order in Council in 1921 to the then Waimea County Council for Plantation Reserve purposes.

Rabbit Island forest is situated on Crown Land which has been vested to the Council for plantation purposes under the provisions of the Reserves and Other Land Disposal and Public Bodies Empowering Act 1920.

An area of Kingsland forest is held as a reserve for waterworks purposes.

Small areas adjacent to Howard forest have Forestry Rights assigned to two different parties, with the Council receiving a share of net returns at harvest. A further Forestry Right at the Sherry River forest is held over a small area of Douglas-fir trees, however the Council receive no share of harvest revenue.

The legal descriptions of the land on which the Council forests are situated on are contained in appendix 1.

**Forestry rights and mining licences**

**Howard Valley**

Parts of the following blocks of Howard Forest are subject to a transfer grant of forestry rights for 30 years (*P. radiata*) and 40 years (*D. fir*) involving a joint venture with Martin Wells.

1. Sections 13, 14, and 15 Block XIV Howard Survey District being a block of 224.7876 ha, of which 6.6 ha *P. radiata* and 11.1 ha *D. fir* planted 1992. Total Forest Right area equals 17.7 ha.

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2. Part Section 36 and 37 Block X Howard Survey District being 142.807 ha (access track only).

Tasman District Council to receive 16% of stumpage at harvest.

Parts of the following blocks of Howard Forest are subject to a similar transfer grant of Forestry Rights for 40 years involving a joint venture with D and A M Bier:

1. Section 9 Block X and Section 16 Block XIV Howard Survey District being 314.4406 ha (access track only).
2. Section 12, Block XIV Howard Survey District being 196.6772 ha, of which 31.0 ha *P. radiata* 1992, and 36.0 ha *D. fir* planted 1993. Total Forest Right area equals 67.0 hectares.

Tasman District Council to receive 20% of stumpage at harvest.

A mining licence in favour of Lewis Creek Mining Society Ltd, C/- Rotoiti Community Council for a term of twenty years commencing 15 December 2004 is held over Sections 13, 14 and 15 of Block XIV Howard Survey District.

### **Sherry River**

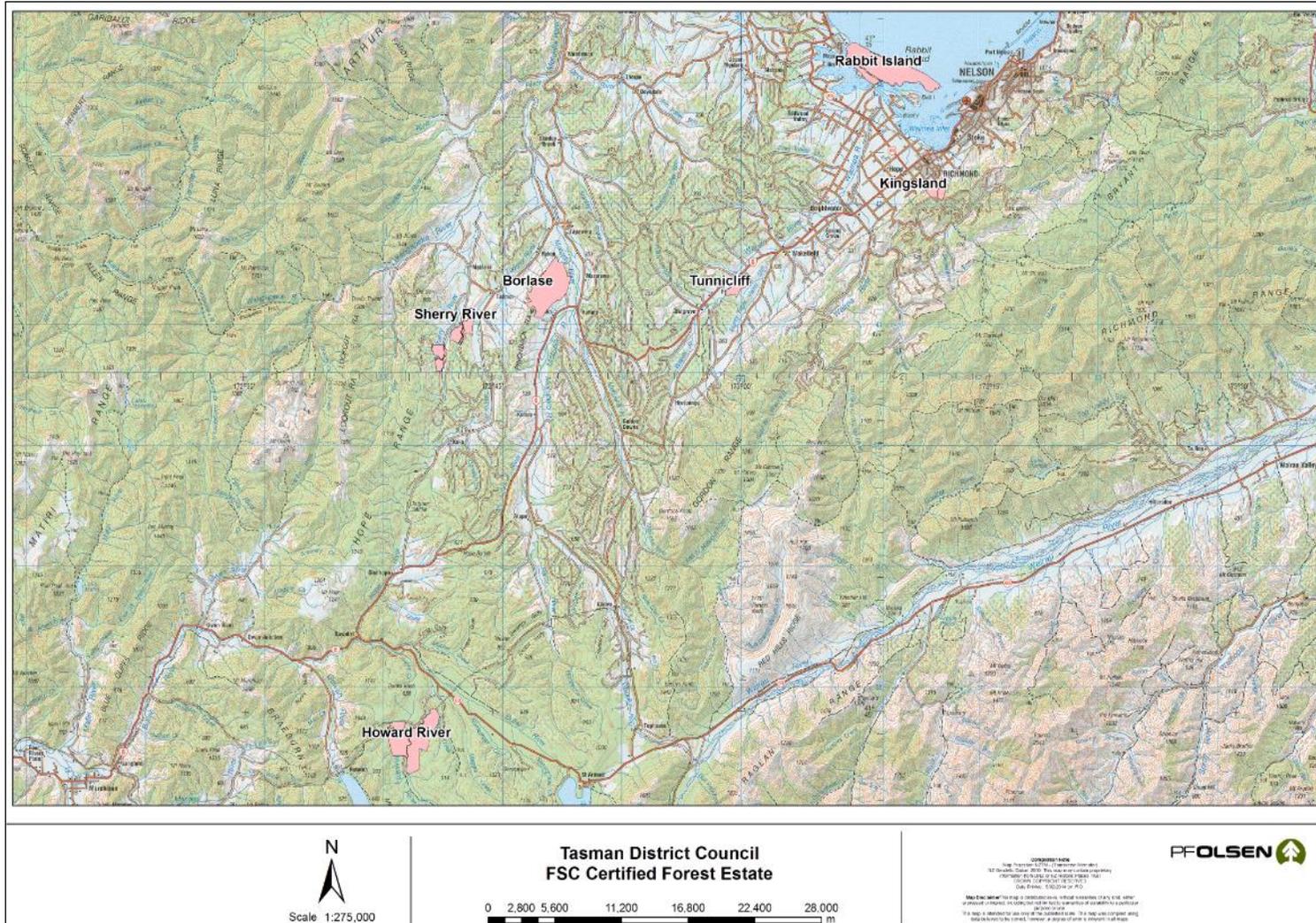
The property has a 99.4 hectare Forestry Right on it (of which 47.2 hectares is planted) in the south western corner of the block. The Forestry Right involves:

1. The Grantee harvesting *P. radiata* prior to the trees reaching 30 years of age, and Douglas Fir/Larch prior to age 45.
2. Rates are payable by the Grantee until clearfell.
3. The Tasman District Council does not receive any percentage share of stumpage at harvest.

The block is progressively being felled and land handed back to Council for replanting. Areas of 18.6ha and 7.7ha were planted in 2002 and 2003 respectively, and further areas will be planted in 2010 following harvesting in 2009.

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**Map 1 - Forest Location Map**



## 4. The Ecological Landscape

**Ecological District** The Council forest estate is geographically diverse, and falls within several different Ecological Districts. Several forests also fall across the border of several EDs, as shown below.

**Table 3: Forest by Ecological District**

Ecological District	Bryant	Motueka	Moutere	Arthur	Rotoroa
Kingsland	✓	✓			
Tunnickliff		✓	✓		
Rabbit Island		✓			
Sherry River			✓	✓	
Borlase			✓		
Howard					✓

### **Bryant**

The Bryant Ecological District steep hill country comprised of a complex matrix of argillite, sandstone, mafic, ultramafic, greywacke and marine sediments. As a result, fertility and drainage varies significantly. The district includes Dun Mountain which is a unique mafic volcanic area with toxic soils and associated rare flora species assemblages.

Elsewhere, indigenous vegetation is restricted to the hills in the east and south, with mixed beech-podocarp forests at higher altitudes, moving into manuka dominated scrub down the altitudinal gradient. The coastal Boulder Bank provides habitat for Arctic breeding and NZ migratory waders, whilst the forests are home to falcon, kaka, kea, blue duck and parakeet. Various skinks and geckos are also found along the rocky coast and tall forest.

Whilst areas of the district remain in tall forest and scrub, much has been replaced by sheep and beef farming and exotic plantation forest. Goat and pig damage is evident along the Bryant Range.

### **Motueka**

The Motueka Ecological District is a small lowland district of plains dissected by the Moutere District hill country. Geological influences include the terrestrial and coastal alluvium at the coastal end, and terraced Moutere gravels within the remainder.

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Originally most of the district was forested with podocarp/hardwood/beechn and smaller areas of raupo/flax wetlands. Polynesian and European arrival saw much of the forest cleared and wetlands drained.

Extensive estuaries in the district provide habitat for more than 50 species of estuarine birds, including Arctic breeding migrants and banded rail and marsh crake. The common landuse types today in the district (dairy farming, sheep and beef, horticulture) offers little habitat for other native species.

### **Moutere**

The Moutere Ecological District is a lower altitude district, ranging from 800m to sea level. The geology is not complex, being almost entirely Pleistocene deeply weathered Moutere gravel, overlying lignite and clay with impeded drainage and moderate to low fertility.

The district was once fully forested with beech dominant forest types, with the addition of podocarps and hardwoods- totara, matai, rimu, miro, kahikatea in wide valley floors, and tawa, pukatea, titoki, karaka, matai, nikau closer to the coast. Much of the more complex hardwood/podocarp forest has been cleared, with only small isolated remnants remaining. One significant tract of beech forest remains, which is habitat for kaka, falcon and parakeet. Banded dotterel, pied stilt and black-fronted tern breed along the Motueka River.

Much of the lower district is now in extensive sheep and beef farming, horticulture and exotic plantation forest.

### **Arthur**

The Arthur Ecological District is mostly mountains and hills 600m to 1500m above sea level, draining NE into Tasman Bay. It has a complex geological history, with marble, indurated mudstone, granite, and a range of schist and quartz subtypes. Most of the District is covered in montane and submontane indigenous vegetation, owing to the higher altitude and terrain. Podocarp and podocarp/beechn types are common in the lower slopes and valleys, moving into red-silver-black-mountain beech species up the altitudinal gradient. Above treeline, the vegetation types are low shrubland, tussockland and herbfields.

The high remaining proportion of indigenous forest has allowed the persistence of kaka, blue duck, falcon, kea, yellowhead and parakeet throughout the ED, and Great Spotted kiwi in the southern end. Nelson Green gecko and several giant snail *Powelliphanta* species can be found in the Arthur Range.

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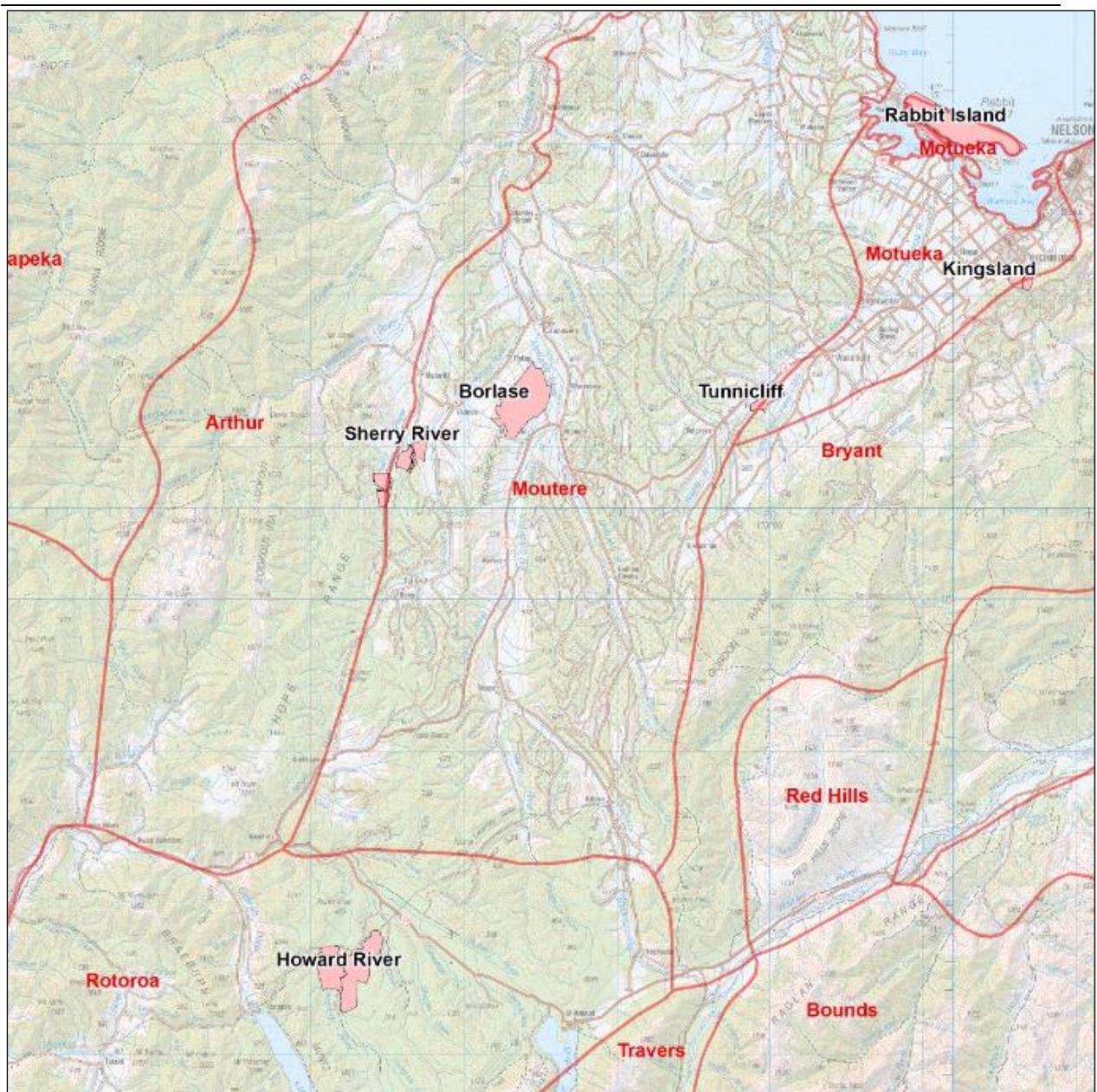
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**Rotoroa**

The Rotoroa Ecological District is predominantly hill country, with shallow, stony gneiss and granite derived soils of low fertility. The district is predominantly still in tall red/silver/mountain beech forest, with podocarps present on warmer slopes. The extensive montane and submontane forests are habitat for Great Spotted kiwi, falcon, spotless crane, kea and kaka, plus several skink and gecko species.

Although much of the district remains as intact tall native forest, there are areas of more intensive sheep and beef, and exotic plantation at lower altitudes.

**Figure 1: Forest by Ecological District**



**Protective Status** The following table shows vegetation types by Ecological District as required by the National Standard for Plantation Forest Management in New Zealand revised in 2013.

**Table 4: Protective status of the ecological landscape**

<b>Kingsland</b>		
Ecological Districts:	Motueka	Bryant
Original (pre-Maori) percentage of ecosystem type in Ecological District within land title:	26,342 ha 100%	88,565.8 ha 100%
Natural ecosystem area remaining	1,260.6 ha 4.79%	55,559.3 ha 62.73%
Proportion of remaining natural ecosystem under protection:	35.4 ha 2.81%	40,133.8 ha 72.24%
Protection by certificate holder as a % of ED	36.9 ha 2.93%	13.4 ha 0.02%
Protected areas as a % of individual forest estate	50.3 ha 33.4%	
Protected areas as a % of the aggregated Group Scheme management estate by Ecological District	54.7 ha 9.0%	13.4 ha 26.2%

<b>Tunnickliff</b>		
Ecological Districts:	Motueka	Moutere
Original (pre-Maori) percentage of ecosystem type in Ecological District within land title:	26,342 ha 100%	128,144 ha 100%
Natural ecosystem area remaining	1,260.6 ha 4.79%	24,237.5 ha 18.91%
Proportion of remaining natural ecosystem under protection:	35.4 ha 2.81%	11,847.5 ha 48.88%
Protection by certificate holder as a % of ED	6.3 ha 0.5%	13.4 ha 0.06%
Protected areas as a % of individual forest estate	20.4 ha 18.2%	
Protected areas as a % of the aggregated Group Scheme management estate by Ecological District	54.7 ha 9.0%	156.3 ha 15.2%

<b>Rabbit Island</b>	
Ecological District:	Motueka
Original (pre-Maori) percentage of ecosystem type in Ecological District within land title:	26,342 ha 100%
Natural ecosystem area remaining	1,260.6 ha 4.79%
Proportion of remaining natural ecosystem under protection:	35.4 ha 2.81%
Protection by certificate holder as a % of ED	11.5 ha 0.91%
Protected areas as a % of individual forest estate	11.5 ha 1.1 %
Protected areas as a % of the aggregated Group Scheme management estate by Ecological District	54.7 ha 9.0%

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<b>Sherry River</b>		
Ecological Districts:	Arthur	Moutere
Original (pre-Maori) percentage of ecosystem type in Ecological District within land title:	125,408 ha 100%	128,144 ha 100%
Natural ecosystem area remaining	94,519.5 ha 75.37%	24,237.5 ha 18.91%
Proportion of remaining natural ecosystem under protection:	78,698.3 83.26%	11,847.5 ha 48.88%
Protection by certificate holder as a % of ED	32.2 ha 0.03%	18.6 ha 0.08%
Protected areas as a % of individual forest estate	98.4 ha 20.0%	
Protected areas as a % of the aggregated Group Scheme management estate by Ecological District	32.2 ha 27.9%	156.3 ha 15.2%

<b>Borlase</b>	
Ecological District:	Moutere
Original (pre-Maori) percentage of ecosystem type in Ecological District within land title:	128,144 ha 100%
Natural ecosystem area remaining	24,237.5 ha 18.91%
Proportion of remaining natural ecosystem under protection:	11,847.5 ha 48.88%
Protection by certificate holder as a % of ED	124.3 ha 0.51%
Protected areas as a % of individual forest estate	124.3 ha 15.3%
Protected areas as a % of the aggregated Group Scheme management estate by Ecological District	156.3 ha 15.2%

<b>Howard</b>	
Ecological District:	Rotoroa
Original (pre-Maori) percentage of ecosystem type in Ecological District within land title:	181,863 ha 100%
Natural ecosystem area remaining	148,656.4 ha 81.74%
Proportion of remaining natural ecosystem under protection:	126,484.5 ha 85.09%
Protection by certificate holder as a % of ED	121.7 ha 0.08%
Protected areas as a % of individual forest estate	121.7 ha 21.1%
Protected areas as a % of the aggregated Group Scheme management estate by Ecological District	121.7 ha 21.1%

**Threatened  
Environments  
Classification**

The Landcare Threatened Environments Classification (TEC) is a measure of how much indigenous vegetation remains within land environments, its legal protection status, and how past vegetation loss and legal protection are distributed across New Zealand’s landscape. The TEC is a combination of three national databases:

- Land Environments New Zealand (LENZ)
- Landcover Database 2
- Protected Areas Network

The TEC uses indigenous vegetation cover as a surrogate for indigenous biodiversity, which includes indigenous ecosystems, habitats, and communities; the indigenous species, subspecies and varieties that are supported by indigenous vegetation; and their genetic diversity. It uses legal protection as a surrogate for the relative vulnerability of indigenous biodiversity to pressures such as land clearance, extractive land uses, and the effects of fragmentation. The TEC is therefore most appropriately applied to help identify places that are priorities for formal protection against clearance and/or incompatible land uses, and for ecological restoration to restore lost species, linkages and buffers.

The table on the following page shows the threatened environments classifications as they pertain to the Council forest estate.

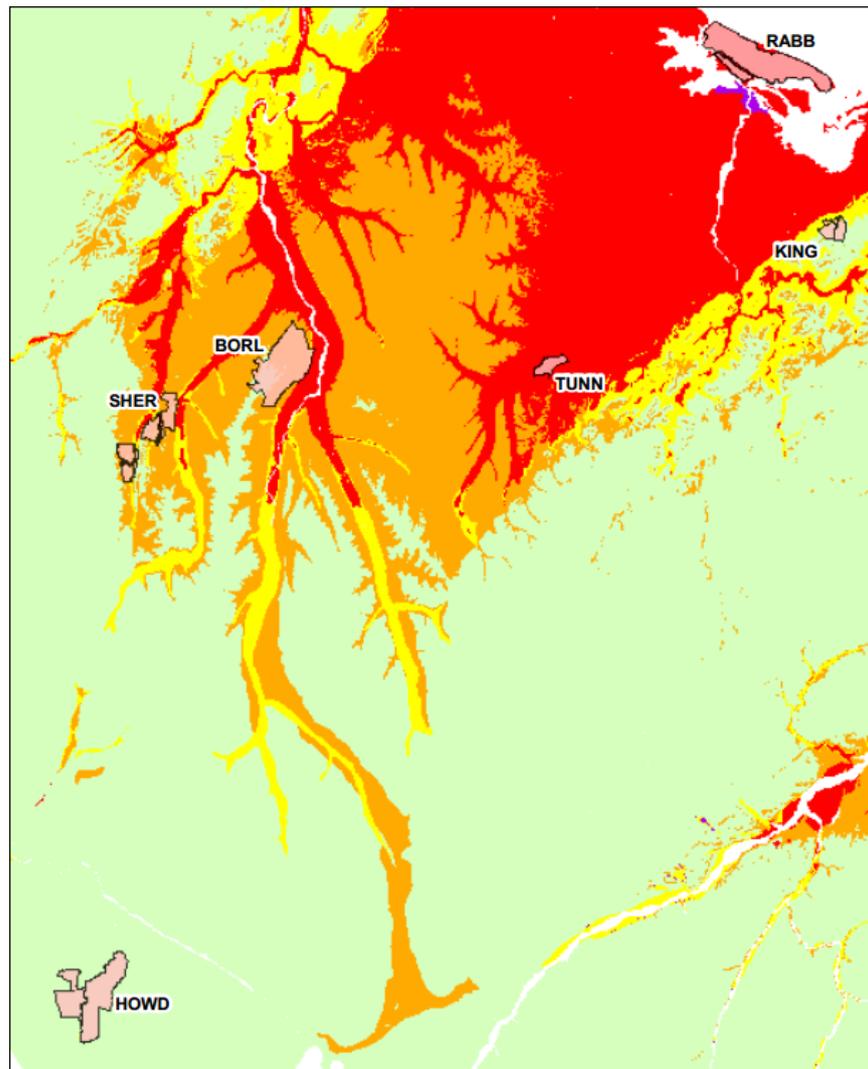
**Table 5: Reserve areas by Threatened Environments Classification**

	<b>BORL</b>	<b>HOWD</b>	<b>KING</b>	<b>RABB</b>	<b>SHER</b>	<b>TUNN</b>
<b>&lt;10% indigenous cover left</b>				11.5 ha 100%		19.7 ha 100%
<b>10-20% left</b>	89.9 ha 72.3%		0.3 ha 0.6%		22 ha 43.3%	
<b>20-30% left</b>			28.4 ha 56.5%		3.2 ha 6.3%	
<b>&gt;30% left and &lt;10% protected</b>						
<b>&gt;30% left and 10-20% protected</b>						
<b>&gt;30% left and &gt;20% protected</b>	34.4 ha 27.7%	121.7 ha 100%	21.6 ha 42.9%		25.6 ha 50.4%	
<b>TOTAL</b>	<b>124.3 ha 100.0%</b>	<b>121.7 ha 100.0%</b>	<b>50.3 ha 100.0%</b>	<b>11.5 ha 100.0%</b>	<b>50.8 ha 100.0%</b>	<b>19.7 ha 100.0%</b>

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**Figure 2: Forest by Threatened Environments Classification**



## 5. Socio-economic Profile and Adjacent Land

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### **Forest history**

The forests have been acquired and developed over many years. Property purchase since the 1990's has been opportunistic by acquisitions of uneconomic sheep farms with the intention to achieve a minimum stocked area of around 3,000 hectares. Priority has been given to land adjacent to existing holdings.

#### **Borlase**

Borlase was purchased to provide an alternative forest resource for the County in the event that Rabbit Island forest was lost to the County for production forestry. The forest was named after Jack Borlase, a Council Chairman.

The bulk of the forest was purchased in 1972 but since then two further blocks have been added being the 160 hectare Moffat and the 104 hectare Quinney blocks acquired in 1992.

#### **Howard**

The Howard block, totalling 995 hectares, was purchased in 1993 from the Marshall family. About 40 hectares (including the homestead) was sold following purchase. Included with the purchase are two Forestry Right Joint Venture blocks, one of 23 hectares and the other of 70 hectares. The Council will receive a share of revenue at harvest. Management of these blocks is carried out independently by the holder of the forestry right and neither of these blocks is included in the certified area.

#### **Kingsland**

Kingsland Forest comprises the Waterworks Reserve Block, the Heslop Block and the most recent acquisition, the Brown Block.

The 72 hectare Waterworks Reserve Block was acquired by the Council (the then Richmond Borough Council) to provide a protected water catchment for the Richmond Borough. It was bought by Council in 1923. The 54 hectare Heslop Block was bought by Council in 1988. The 18 hectare Brown Block was purchased and planted in 1994. A further small area was bought from the Heslop family in 2013, near the reservoir.

#### **Rabbit Island**

Rabbit Island is Crown Land which was vested to the Tasman District Council (formerly the Waimea County council) in 1921 for plantation purposes under the provisions of the Reserves and Other Land Disposal and Public Bodies Empowering Act 1920.

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In 1921 the first plantings of radiata pine took place, with afforestation coming under the Council Engineers Department. The Order in Council of 22 August 1921 excluded some 143 hectares of Rabbit Island from use for plantation purposes. This land area consisted mainly of a 5-chain wide strip of land along the northern, western, and eastern coasts of the Island, along with a 15-chain strip along part of the northern side of the Island which now includes the main public domain area. The domain area has since been increased to 240 hectares.

### **Sherry River**

The Tasman District Council purchased 623 hectares of terraces, hill country, pasture and reverting scrub land in the Sherry River area in November 1994. The better terraces and the homestead have since been sold and 18 hectares of pasture is leased to Mr . Included with the purchase was a Forestry Right Joint Venture block that is progressively handed back to the Council, and currently the only remaining block comprises 7ha of Douglas-fir planted in 1982.

A decision on whether to continue leasing the river-flat block for grazing to Mr after his lease expires in 2015 will need to be made.

### **Tunnickliff**

This block, legal title area 133 hectares, was purchased in 1971 from Mr Henry Tunnickliff. Included in the title area is approximately 20 hectares of native bush. The first plantings took place in 1971-72 entirely in radiata pine. These have all been harvested and re-planted predominantly in radiata pine with some small areas of Douglas-fir and *Cupressus* species.

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**Current social profile**

The Tasman region, in which the Council estate falls, is one of the least populated in New Zealand (from Statistics NZ):

- 44,625 people
- 12th largest population out of the 16 regions in NZ
- 1.1 percent of New Zealand's population
- Māori population size ranks 15<sup>th</sup> out of the 16 regions in NZ

Combining data from the Atlas of Deprivation (Ministry of Health) and average income from Statistics NZ, it is apparent that the Tasman region fares reasonably well in terms of overall wealth, and distribution of wealth throughout the district. Age and family statistics confirm the higher number of families and elderly within the region than the national average.

Due to the size of the Council forests in a regional context, all of the workers are employed by contractors who also work for a number of other forestry companies and are not dependent on the Council forests for full time employment.

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**Neighbours**

Neighbours to the forest estate boundaries have a special interest in the management of the forest. Activities within the forest may positively or negatively impact upon their quality of life or businesses in a number of ways, while inappropriately managed operations could create risks of adverse health, safety and environmental hazards. Neighbours may use the forests for recreational purposes or place reliance on the forests for provision of water. Boundary issues such as weed and pest control, access and boundary alignment issues may also involve neighbours.

Appendix 2 lists the forest neighbours. Some or all of these parties should be consulted when operations are proposed in forest areas adjacent to their boundaries. A location map is included in appendix 3.

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**Community environmental restoration groups**

There are a number of very active community action groups active in Rabbit Island and Kingsland forest and surrounds undertaking activities from pest weed control, vertebrate pest trapping, amenity and ecological restoration plantings, walking track assets and dune /foreshore restoration efforts. These dedicated groups acting independently but coordinated at an overview level by Council Reserves staff and also funded and supported by formal Council reserves management activities are a highly valuable community resource that are jointly achieving significantly greater ecological restoration gains in the Council forest reserves than would normally be achievable from centralised management interventions alone for the same financial input. Close liaison, cooperation with and support of the objectives of these groups is intended.

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**Associations with  
Tangata Whenua**

There are currently no direct 'day to day' associations with local Iwi; however where input is required for resource consents extensive consultation is carried out. In the recent past, harvesting operations within Rabbit Island have involved Tiakina te Taiao Ltd, a non-profit iwi environmental agency that represents four of the six iwi in the Whakatū and Motueka rohe.

Te Kahui Mangai, the NZ government's directory of Iwi and Maori organisations, identify Iwi groups associated with a region by:

- Iwi recognised by the Crown in the Māori Fisheries Act 2004,
- Any other iwi/hapū groups that have been formally recognised by the Crown for historic Treaty settlement purposes.

Most of these recognised iwi/hapū are represented by an Iwi authority for the purposes of the Resource Management Act 1991.

Maori groups associated with the area containing the Council forest estate as recognised by Te Kahui Mangai are:

- Ngāti Toa Rangatira
  - Te Atiawa o Te Waka-a-Māui
  - Ngāti Apa ki te Rā Tō
  - Ngāti Kuia
  - Ngāti Rārua
  - Ngāti Koata
  - Ngāti Tama ki Te Tau Ihu
-

## 6. The Regulatory Environment

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**Regulatory considerations**

In order to minimise the risk to forest owners, managers and contractors, it is important that relevant legislation and agreements are identified and appropriate measures put in place to ensure that breaches of legislation are avoided.

The following legislation and agreements summarise key regulatory and voluntary controls that currently apply to forest operations in the forest.

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**Resource Management Act**

The Council forest estate is subject to the provisions of the Resource Management Act (RMA) 1991. The RMA sets up a resource management system that promotes the sustainable management of natural and physical resources and is now the principal statute for the management of land, water, soil and other resources in New Zealand.

All of the Council forests are located within the boundaries of the Tasman District Council. The Council has the functions of both a regional council and a territorial authority. The Council has prepared a Tasman Resource Management Plan (TRMP) under the RMA to assist it carry out its functions in order to achieve the purpose of the Act.

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**Combined District and Regional Plan**

The TRMP is a combined district and regional plan and states the objectives, policies and methods to achieve integrated management of the various natural and physical resources in the Tasman district. The current plan was notified in 1996 and is operative.

The TRMP uses Zones and Areas in conjunction with rules to manage adverse environmental effects. Zoning is used to classify land into its productivity capacity and intended use. All of the Council forests are in either Rural 1 or Rural 2 zones, where forestry is a permitted use.

Erodibility of the land is classified by the two Land Disturbance Areas. All of the Council forests are in Land Disturbance Area 1, apart from a small area of Sherry forest which falls in Land Disturbance Area 2, comprised of the highly erodible granite soils (table 6).

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**Table 6: Zones and Areas by Forest**

<b>Forest</b>	<b>Zone</b>	<b>Land Disturbance Area</b>	<b>Other</b>
Borlase	Rural 2	1	Cultural Heritage sites adjacent to boundary
Howard	Rural 2	1	One Cultural Heritage site within forest, others on boundary Black-fronted tern nesting site
Kingsland	Rural 2	1	Water Management Area*
Rabbit Island	Rural 2 Open Space (coastal strip) Recreation	1	Water Management Area* Natural Ecosystem (Waimea Inlet)
Sherry River	Rural 2 (predominant) Rural 1	1 (predominant) 2	
Tunnickliff	Rural 2	1	Water Management Area*

\* Applies to new planting (afforestation) only

**Permitted Activity rules**

The table below summarises the forestry related rules as they affect the Council forests for permitted activity levels. Inability to meet any of these permitted constraints implies the need for a resource consent to carry out the activity. Prior to operations commencing, the forest manager must check the current version of the plan to ensure the activity status.

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**Table 7: Tasman Resource Management Plan rules as they affect forestry**

<b>Region Wide Rules</b>	
Culverts, fords, bridges	Not in water conservation order waterbody
	Does not impede floodflow, cause scour, includes inlet/outlet scour protection as required but no demolition material
	Maintained in good condition, free of obstructions
	No disturbance May-September in trout rivers, or 15 Feb to 31 May in inanga rivers
	No disturbance October- February in black fronted tern nesting sites
	No disturbance October- December in black-billed gull nesting sites
	All culverts built since 2010 must have fish passage, those existing as at 2010 must have fish passage by February 2015
	In LDA2, cut and fill for installation not to exceed 0.5m
	Must accommodate 2% annual exceedance probability flood flow that may include overtopping function, but does not cause flooding upstream or on neighbouring properties
	Culverts: stream <3m width, <2m fill (except if designed for 1% annual exceedance flood and secondary flowpath designed), <15m culvert pipe
	Bridge: single span, if built after Feb 2010 soffit either 0.5m above bank, or 0.5m above 2% annual exceedance flood level, whichever lower
Vehicle crossings	Sediment discharge complies with 36.2.2.4 and 36.2.3.1
	Shortest route taken
	Annual exclusion periods for black-billed gull, black fronted tern, dotterel and SI Pied Oyster Catchers in certain braided rivers e.g Howard and Motueka rivers- see TRMP
Gravel extraction	<5m <sup>3</sup> /year- see plan for specific river limits for controlled limits
	Riverbed <10m wide
	Material removed is >600mm above waterlevel
	Removal does not result in hole >600mm in riverbed
	No removal within 20m of structures, including stopbanks
	No damage to banks
	Annual exclusion periods for black-billed gulls, black fronted terns and inanga rivers- see plan
	Material not sold or used by a third party
	No disturbance to wetted part of riverbed

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Sediment discharge to land/water	No damming/erosion/diversion of a waterbody
	No sediment deposition to waterbed
	Black disc clarity not reduced by more than 40% below discharge: 50m for streams <5m, 100m for stream 5-20m or into coastal marine area
	No conspicuous oils/films/scum/foam/suspended/floating sediments
	If hazardous substances stored/used at site, must comply with TRMP
	Discharge structure is in good condition and maintains fish passage
	Infiltration rate > discharge rate
	Groundwater >2m below surface, slope >15°
Fertiliser/chemical discharge to air	No contaminant beyond boundary- if a possibility, see plan for notification/dwelling setback rules
	Does not exceed label rate
	No discharge to waterbodies or where runoff will reach waterbody
	Registered applicator or Growsafe or under supervision of
	Aerial: written record kept- see 36.6.2.1 (f)
Burning	Smoke not to exceed 20% except <2 minutes per hour beyond boundary
	Outside Fire Ban Area and coastal marine area foreshore, and Fire Sensitive Area June- August
	Does not reduce traffic visibility
	Burn vegetation from no more than 3 adjoining properties

**Specific Zone Rules**

	<b>Rural 1</b>	<b>Rural 2</b>
Forestry	Soil: < 50m <sup>3</sup> disturbed in 12 months	As for Rural 1, but noise limits do not apply for forestry and tree harvesting activities
	Noise: Leq Day 55 dBA, night 40 dBA, L <sub>max</sub> 70 dBA	
	50m setback from Residential Zone boundary and Coastal Marine Area	
	30m setback from a dwelling	
	10m from other boundaries unless will shade road/dwelling 10am-2pm on the shortest day	
	10m from road, streams >3m, lakes	
Indigenous vegetation removal	Not a wetland, dune vegetation, salt herbfield, woody vegetation in Coastal Environment Area	As for Rural 1
	Less than 0.2 ha per site in 3 years	

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**Area Rules**

	<b>Land Disturbance Area 1</b>	<b>Land Disturbance Area 2</b>
General	No diversion or damming of any river or stream	No diversion or damming of any river or stream
	Does not cause erosion of the bed of any river or stream	Does not cause erosion of the bed of any river or stream
	Bare ground protected from erosion by revegetation or other methods as soon as practicable, but no later than 12 months	Bare ground protected from erosion by revegetation or other methods as soon as practicable, but no later than 12 months
	Rootraking on land less than 25°	Chemical or hand clearance of vegetation
	Blading on land less than 25° except for maintaining tracks/firebreaks	Vegetation clearance: cultivation, roller crushing, slash raking, cable hauling. By fire if <20°, rootraking, blading <15°
	Does not remove vegetation/earthworks established for soil conservation by Council	
Vegetation removal	Indigenous vegetation: More than 15m from stream >3 metres unless in conjunction with permitted earthworks or incidental to exotic tree removal	Indigenous vegetation: More than 15m from stream >3 metres unless in conjunction with permitted earthworks or incidental to exotic tree removal
	Indigenous vegetation: More than 15m from any lake	Indigenous vegetation: More than 15m from any lake
Earthworks	More than 10m away from any lake	Within 200m of Coastal Marine Area: less than 1000m <sup>2</sup> in 12 months if publicly visible or adjacent to natural ecosystem value area
	More than 10m away from any stream >3m on a predominant slope <20° unless for stream crossing	
	More than 20m away from any stream >3m on a predominant slope >20° unless for stream crossing	
	Within 200m of Coastal Marine Area: less than 1000m <sup>2</sup> in 12 months if publicly visible or adjacent to natural ecosystem value area	
	Greater than 50m <sup>3</sup> and extends below water table if more than 20m from a stream or toe of any stopbank, and not on a floodplain	
Quarrying	<50m <sup>3</sup> in any 12 month period	<50m <sup>3</sup> in any 12 month period
Cultivation	Predominantly on the contour	Predominantly on the contour
Recontouring	Cut batter, excavation and infilling no more than 1m height, and no more than 1 hectare in any 12 month period	

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Roads, tracks, firebreaks, landings	Linear disturbance less than 100m/ha, predominant slope <35°	Cut batter and excavation less than 0.6m
	Inwards crossfall are drained by a watertable	Inwards crossfall are drained by a watertable
	Cutoffs/culverts installed to prevent scour and erosion	Cutoffs/culverts installed to prevent scour and erosion
	Fill not placed on woody vegetation on land >10°	
	Fills that will carry loads are compacted	
	Batters are constructed/vegetated to prevent erosion and failure	
	Spoil is endhauling not sidecast when track/road crosses any unstable site or crush zone	
Maintenance of any road, track or firebreak retains same grade and width	Maintenance of any road, track or firebreak retains same grade and width	
Archaeological sites	Archaeological authority held for activity	Archaeological authority held for activity

**Cultural, historic and archaeological sites**

Under the Historic Places Act 1993 it is the landowner’s responsibility to identify any historic sites on their land prior to undertaking any work which may disturb or destroy such sites. Records of archaeological and historical places are maintained in the NZ Archaeological Association (NZAA) Site Recording Scheme <http://www.archsite.org.nz/> .

If a site is found or suspected on any block, the protocols specified in PF Olsen’s EMS, and any others specifically developed in conjunction with HPT and Iwi or other stakeholders, must be observed. Where such circumstances require, an ‘Authority to Modify or Destroy’ will be sought from HPT. Such authorities are similar in function to a resource consent and, if granted, normally come with conditions that must be met. The process to apply for authorities is documented in PF Olsen’s EMS.

Note also that authorities to modify an archaeological site may sometimes be required from Council and sites of cultural significance are often included in schedules of places and sites of significance in District Plans. Update checks for any sites will be required before any harvesting or related earthworks commences.

Checks of the NZAA website show the following sites within or near the forest boundary. The locations of these sites are shown on the forest stand maps in appendix 4.

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There are also several areas identified to be ‘of-interest’ within Rabbit Island by the local iwi group Tiakina te Taiao. To date, no finds/discoveries of sites or artefacts have been made within the areas. No biosolid spraying is carried out in the areas but there are no other restrictions on any other operations. These areas are not recorded with NZAA. These areas are also shown on the forest stand map in appendix 4.

**Table 8: Archaeological and significant sites near the Council forest estate**

Forest	Location	Site	Type
<b>Borlase</b>	190m from forest boundary	N28/19	Maori argillite working
	30m from forest boundary	N28/1	Findspot: Maori oven utensils
<b>Howard</b>	Within forest	M29/28	Water race and hut
	35m from forest boundary	M29/36	Goldworkings
	60m from forest boundary	M29/30	Possible guesthouse
	120m from forest boundary	M29/27	Goldworking and road
<b>Kingsland</b>	50m from forest stand	N27/185	Historic dam
<b>Rabbit Island</b>	Within forest	N27/101	Midden
	Within forest	N27/134	Midden
	Within forest reserve	N27/131	Hunter Brown Reserve. Oven and middens
	12m from forest boundary	N27/152	Artefact
	55m from forest boundary	N27/137	Findspot: adze. Oven and middens.
<b>Sherry River</b>	Within forest		Significant site: memorial
<b>Tunnickliff</b>	-	-	-

**Consents and authorities held**

There is one current resource consent that applies to the Council forests at present, as below. No HPT authorities are currently held.

**Table 9: Resource consents applicable to the Council forest estate**

Consent Id	Expiry	Forest	Details
RM130822	13/12/2015	Howard	Use 2 fords in Howard River Oct-Feb within black-fronted tern nesting site

**The Emissions Trading Scheme**

Forests in New Zealand are governed by rules related to New Zealand’s Kyoto commitments to reduce the nation’s carbon footprint and contribution to associated climate change.

Council forest contains 1,964.3 hectares of forest that was existing forest as at 31<sup>st</sup> December 1989. At the time of harvest, these stands will be subject to a deforestation tax equivalent to the tonnes of CO<sub>2</sub> projected to be released from decomposition of the forest at a unit financial value determined by the internationally traded emission units. This tax is payable if the forest is not replanted or, if left to regenerate naturally, does not achieve the regulated heights and stocking densities.

A total of 1,065.7 hectares was planted on ‘Kyoto compliant’ land that was vacant as at 31<sup>st</sup> December 1989 and have been registered to participate in the NZ Emissions Trading Scheme. These areas are subject to the accrual of emissions credits and liabilities under that scheme.

**Environmental Code of Practice**

All operations carried out on the property should be undertaken to the standards specified in the New Zealand Environmental Code of Practice for Plantation Forestry. This document sets out guidelines which ensure safe and efficient forest operations that meet the requirements of sound and practical environmental management.

**Forest Road Engineering Manual**

Roading and engineering techniques employed within the forest should conform to the industry best practice as outlined in the New Zealand Forest Owners Association publication, “NZ Forest Road Engineering Manual”, published 2012.

**Other relevant legislation**

For a comprehensive list of relevant legislation refer to PF Olsen’s EMS. Forest owners can be held liable for breaches of these Acts and may be held responsible for damage to third party property. Appropriate protection should be taken to minimise these risks.

Other relevant legislation includes:

- Animal Welfare Act 1999.
- Biosecurity Act 1993.
- Climate Change Response Act 2002.
- Conservation Act 1987.
- Crown Forest Assets Act 1989.
- Fencing Act 1978.
- Forests Act 1949.
- Forest and Rural Fires Act 1977.
- Forests Amendment Act 1993.
- Forestry Rights Registration Act 1983.
- Fresh Water Fisheries Regulations 1983
- Hazardous Substances and New Organisms Act 1996.
- Health in Safety in Employment Act 1992.
- Historic Places Act 1993.
- Injury Prevention, Rehabilitation and Compensation Act 2001.
- New Zealand Forest Accord.
- Noxious Plants Act 1978.
- Pesticides Act 1979.
- Reserves Act 1977.
- Resource Management Act 1991.
- Soil Conservation and River Control Act 1971.
- Trespass Act 1980.
- Wildlife Act 1953.

## 7. Forest Estate Description

### Forest area

The net stocked areas have been measured from maps produced by PF Olsen. The estimated net stocked areas of each forest as at 31 December 2013 are set out in the following table.

**Table 10: Forest area (ha)**

Forest	Planted	Cutover	Reserve	Total (ha)
Borlase	701.3	0.3	126.5	<b>828.1</b>
Howard	454.8	-	121.7	<b>576.5</b>
Kingsland	100.2	-	50.3	<b>150.5</b>
Rabbit Island	975.0	39.5	66.2	<b>1,080.7</b>
Sherry River	392.8	-	98.4	<b>491.2</b>
Tunnickliff	91.9	-	20.4	<b>112.3</b>
<b>Total (ha)</b>	<b>2,716.0</b>	<b>39.8</b>	<b>483.5</b>	<b>3,239.3</b>

### Treestocks

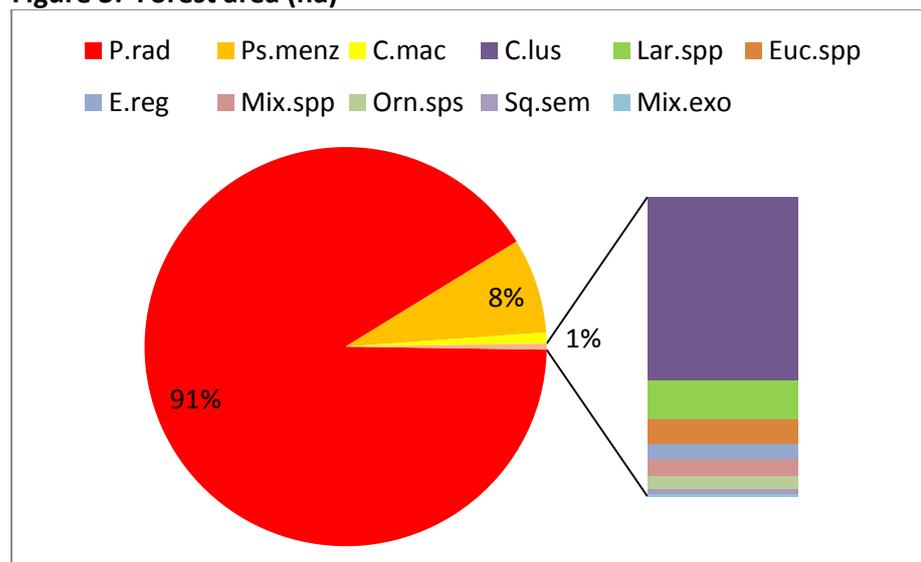
Known treestocks, including species, GF rating and seedlot, established in each of the Council forests are summarised in appendix 5.

### Species mix

The main species grown within the Council forests is *Pinus radiata* (radiata pine). This species has been chosen to best meet the management objectives given the characteristics of the forest land.

The species mix of the Council forests is illustrated below.

**Figure 3: Forest area (ha)**



**Productivity indices**

The most common estimate of the productivity of a site is the site index. Site index is a measure of productivity of a site in terms of height growth of radiata pine at age 20.

Another measure of productivity is the 300 index, which estimates the stem volumes mean annual increment at age 30 for a regime of 300 stems/hectare.

**Table 11: Site index and 300 index values for the Council forests**

Forest	Site index average (m)	300 index Range (m <sup>3</sup> /ha/year)
Borlase	28.1	20 – 30
Howard	26.0	17.5 – 25
Kingsland	28.5	27.5 – 35
Rabbit Island	28.2	15 – 25
Sherry River	29.5	20 – 30
Tunncliffe	32.0	22.5 – 32.5

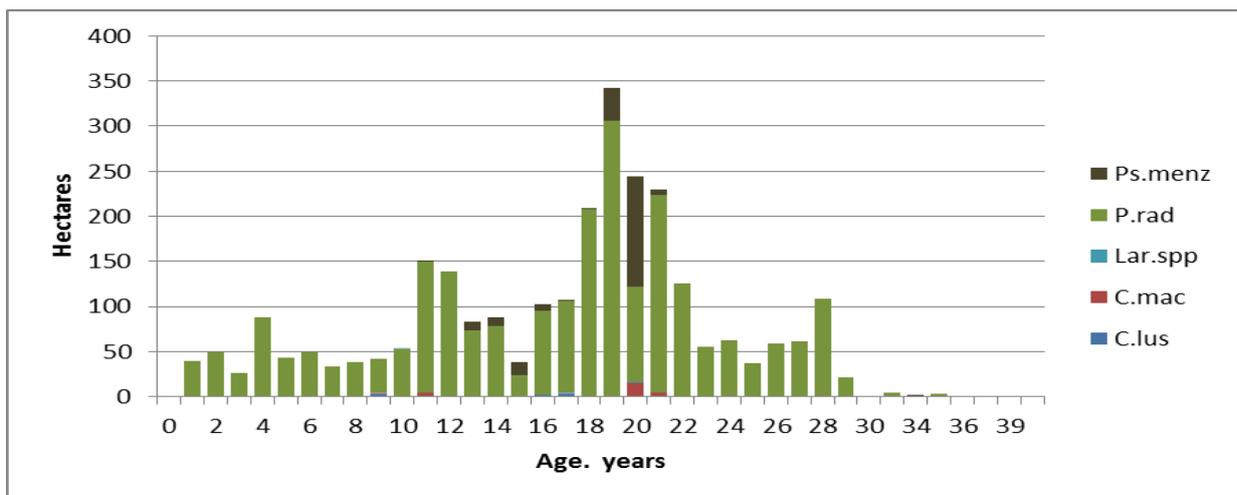
**Current crop status**

Measurement data from the most recent inventory is stored in FIPS and summarised in reports to provide the current status of the stands. Due to the large volume of data for this estate this information is not presented in detail, but refer to Section 12 - Commercial Crop Establishment and Silvicultural Operations for more detailed information regarding tending regimes.

**Age class distribution**

The age class distribution, as at December 2013, of the Council forest estate is illustrated below.

**Figure 4: Age class distribution of the Council forest estate**



## 8. Reserve areas and Significant Species

### Introduction

The Council forest estate contains a total of 456.3 hectares of reserve areas and protected ecosystems.

Two broad classifications are used in the differentiation and management of non-commercial value within the Council estate. Reserves are areas including exotic vegetation areas that have protective constraints applied to ensure the continued provision of amenities and environmental services, even though the actual ecological value of the site itself may be limited. Protected ecosystems are areas of natural vegetation protected for their intrinsic ecological values.

### Reserve areas

The two landscape reserves on Rabbit Island are coastal margins that have been excluded from production for visual reasons. The rare species reserve is adjacent to one of these landscape reserves, and is under protection for providing shorebird nesting habitat.

The areas at Rabbit Island gazetted for recreation are managed by the Council Parks department in accordance with the 'Rabbit Island Recreation Plan'. The Great Taste Cycle Trail runs through Rabbit Island. The south-eastern and south-western sides of the island have reserves established to protect archaeological values, and the east and west coasts have high profile amenity values being protected by implementing replanting buffers.

The riparian reserve is an area either side of a small stream that runs through Sherry River. This area has been granted protective status as it provides riparian buffering to the stream, but unlike many riparian areas, the vegetation is not predominantly indigenous. The protected ecosystems and reserve areas, as at December 2013, are shown on the Forest Stand Map in appendix 4.

**Table 12: Protected ecosystems and reserve areas**

Protective Function	Borlase	Howard River	Kingsland	Rabbit Island	Sherry River	Tunnickliff	Total
Landscape/Amenity				3.8			3.8
Rare Species				6.1			6.1
Recreation				96.2			96.2
Riparian Ecosystem	63.7	2.1	11.9		46.1	3	126.8
Terrestrial Ecosystem	37.6	117.8	23.7		14.8	12.9	206.8
Waahi Tapu				9.4			9.4
Wetland Ecosystem		1.8		5.4			7.2
<b>Total (ha)</b>	<b>101.3</b>	<b>121.7</b>	<b>35.6</b>	<b>120.9</b>	<b>60.9</b>	<b>15.9</b>	<b>456.3</b>

**Protected ecosystems**

The protected ecosystem assessment process includes classification of each area on the basis of its representativeness, rarity, size, connectivity, and landscape values. A score is applied to each assessed component resulting in an overall ecological ranking, which will be used to assist future management prioritisation.

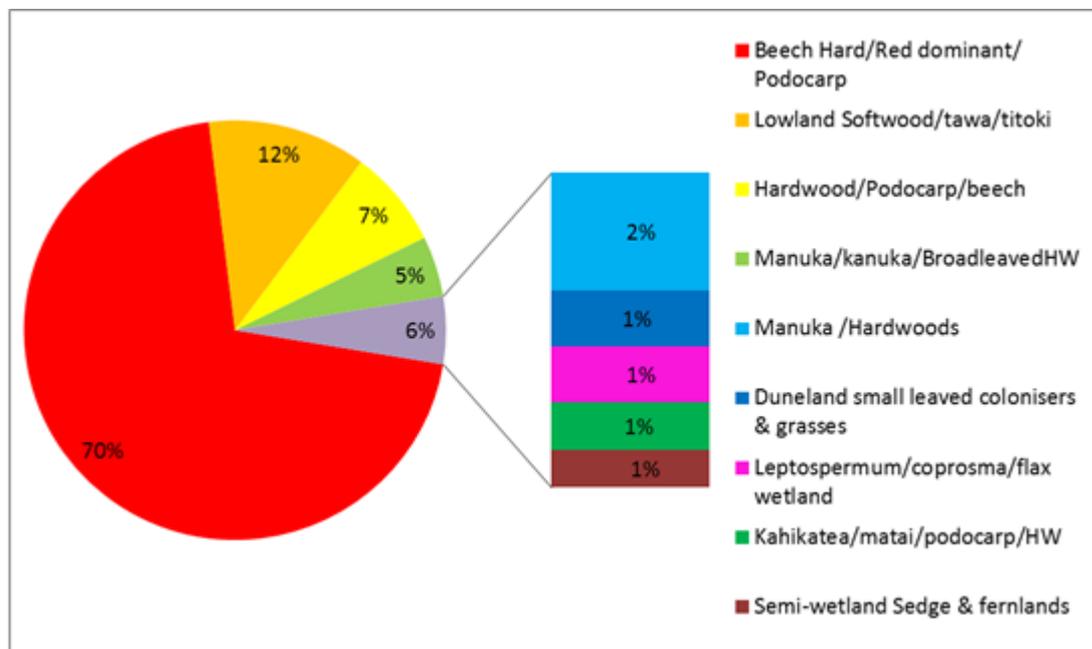
Efforts have been made to locate and describe all indigenous ecosystems within the Council forest estate. A steady programme of qualitative survey has been implemented. Coarse-level assessments and mapping has been done, and the larger and more ecologically significant areas have been described in greater detail. The remaining small areas will be further assessed as pre-operational planning progresses in each of the forests, particularly prior to harvesting in areas adjacent.

The 378.7 ha of protected natural and semi-natural ecosystems identified have been mapped and classified. The results are summarised to show the major identified land cover associations and their current protective status.

**Ecosystem types**

The most common vegetation type within the Council forest estate is beech/podocarp forest, at 70% of the total area of protected ecosystems within the estate. This is followed by lowland softwood/tawa/titoki (12%) and hardwood/podocarp/beech (7%).

**Figure 5: Vegetation types within protected ecosystems**

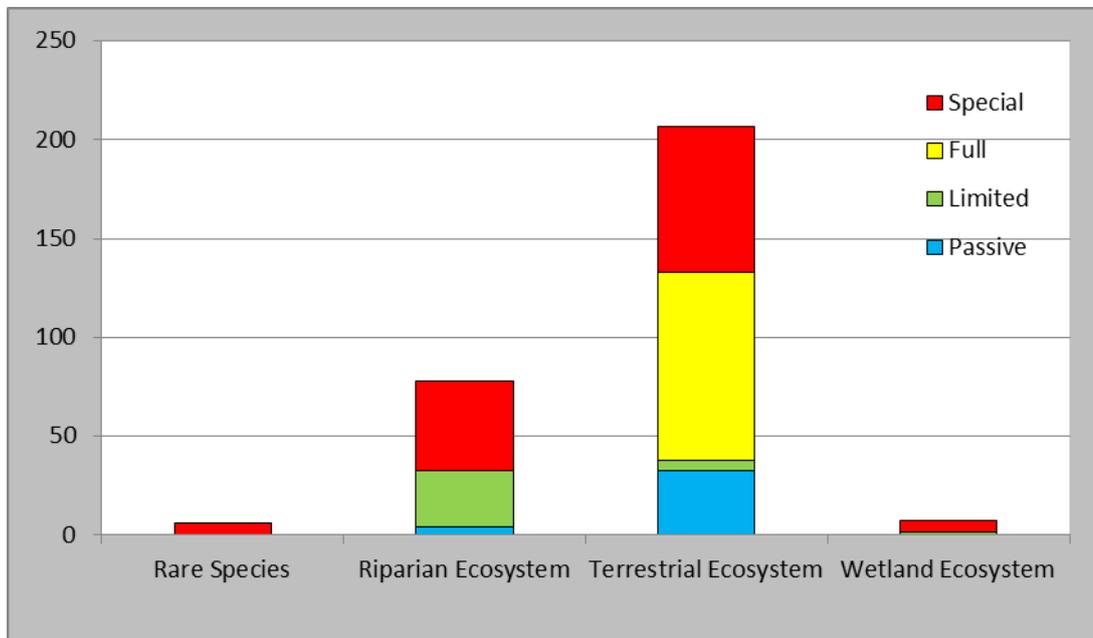


**Protective status**

The system used to classify ecosystems is based on multiplicative ranking of representativeness, rarity/special features, buffering/connectivity, size, habitat and visual values. The overall score places the area into ‘special’, ‘full’, ‘limited’ or ‘passive’ protection categories.

‘Special’ implies that the area may warrant specific investment in restoration. From the figure above, it is evident that the most predominant ecosystem type is terrestrial, with a very small area of rare species habitat and wetlands. The proportion of ‘special’ ranked areas overall is very high, owing to the lowland locations of some of the forests, where generally in the Nelson region it is uncommon for indigenous forests to remain intact. These areas have been identified as High Conservation Value Forests (HCVFs).

**Figure 6: Protected ecosystems by function and category**



**High Conservation Value Forests**

FSC forest management standards include several requirements for managing critically important forest areas, known as High Conservation Value Forests (HCVFs). These HCVFs have an especially high ecological or social value, as defined by several specific FSC criteria.

There are several areas within Rabbit Island and Kingsland forests that fall within the ‘special’ protection category and have been identified as meeting one or more HCVF criteria. These areas are described in detail in Appendix 6.

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Typical for most of New Zealand wetlands are particularly depleted environments and in the Moutere and Motueka ED's are present at less than 5% of their original extent. For this reason the wetlands in Rabbit island are particularly significant and accorded "special" and "HCV" status. Others that may be small and currently unrecorded within the forest boundaries will be accorded special attention during operations to ensure best possible protection.

**Riparian reserves**

A standardised GIS-based stream classification system has been developed specifically for PF Olsen, based on NIWA's River Environment Classification (REC) and Freshwater Environments of New Zealand (FWENZ) models. Categorisation of each stream reach is done by the physical characteristics of the particular reach, e.g. underlying geology, streambed slope, climate, and reach order.

Each stream category corresponds with a set of rules in the EMS that apply to operations occurring near the riparian reserve in order to provide for conservation the stream values.

The stream categories within Council forest are summarised below. The total length of waterways within the forest estate is 78.3 kilometres.

**Table 13: Riparian reserve categories**

<b>REC Class</b>	<b>Length (m)</b>
Large_Low_Wet_Hard	3,914
Large_Low_Wet_Soft	13,706
Large_Mod_Wet_Soft	1,773
Med_Low_Dry_Hard	3,059
Med_Low_Wet_Hard	3,396
Med_Low_Wet_Soft	12,804
Med_Mod_Dry_Hard	13,069
Med_Mod_Wet_Hard	6,350
Med_Mod_Wet_Soft	1,139
Small_Low_Dry_Hard	2,046
Small_Low_Dry_Soft	495
Small_Low_Wet_Hard	777
Small_Low_Wet_Soft	6,115
Small_Mod_Dry_Hard	6,611
Small_Mod_Wet_Hard	2,051
Small_Mod_Wet_Soft	1,007
<b>Total</b>	<b>78,310 m</b>

**Rare and threatened species**

A database of rare species sightings is maintained for the Council forest estate. Information to date already identifies several species utilising the forests.

Western weka are known to be in Kingsland forest in the Richmond foothills, and have recently been reported within Rabbit Island also. Weka numbers in the Nelson region are reportedly bouncing back, with reports of weka seen in gardens along the Richmond foothills, the Brook Valley, the Grampians and out to Atawhai.

Black-fronted tern are known to nest within the stony/sandy islands within riverbeds in the Howard forest area. New Zealand falcon is commonly sighted within Borlase forest.

The eastern reserve on Rabbit Island is one of eleven sites in the Tasman area deemed internationally important for the habitat it provides for endemic and migrant shorebirds (oystercatchers, stilts, plovers and sandpipers), for both roosting and nesting.

There are a number of volunteer groups undertaking predator control in the Nelson region, including within the two large reserve areas in Kingsland, and around the nesting site on Rabbit Island.

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**CITES species**

CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement between governments.

Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten the survival of the species in the wild, and it accords varying degrees of protection to more than 34,000 species of animals and plants.

The full list of New Zealand CITES listed species is available in the EMS, or online at <http://www.doc.govt.nz/about-doc/role/international/endangered-species/cites-species/nz-cites-listed-species/>.

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## 9. Forest Products and Other Special Values

### Introduction

Forest plantations can provide non-timber forest products and special values that enhance the economic wellbeing of the owner or legitimate forest users. Non-timber products are an important means of maximising the production capacity of the forest whilst maintaining environmental and social values. The forest management plan provides procedures for developing and managing these resources.

### Environmental and Social cost-benefit analysis

Forests can deliver numerous social and environmental products, both positive and negative to varying degrees. These non-timber products can be difficult to quantify, unlike financial costs and benefits.

The table below rates the relative positivity and negativity of the more common social and environmental products produced by Council forest relative to the most likely alternative primary production system, pastoral drystock farming.

**Table 14: Environmental and social cost-benefit analysis**

Environmental or social product	Increasingly negative				Neutral			Increasingly positive			
	-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Soil stabilisation							HP			✓	
Erosion/soil loss					HP						MR
Water quality				HP							MR
Riparian shading					HP					MR	
Water quantity			HP		MR						
Carbon sequestration			HP								MR
Native wildlife habitat										✓	
Threatened fauna									✓		
Native fish				HP						✓	
Air quality					HP		MR				
Native reserve protection										✓	
Landscape/visual			HP					MR			
Recreation				HP							MR
Commercial forest use										✓	
Firewood						MR					HP
Local employment				MR							HP

*NB: where the ratings differ throughout a rotation, 'MR' is used to indicate the mid rotation (growing) stage of the forest, and 'HP' refers to during or post-harvest.*

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**Non-timber forest products** There are no FSC certified non-timber products currently being produced or developed in the Council forest estate.

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**Other special values** The following special values have also been identified in the Council forests:

- Sewerage irrigation is carried out over plantation areas within Rabbit Island. These areas are well away from publicly used recreational areas, with restrictions put in place on public access where required. Irrigation is strictly controlled by resource consents that are held by Council for effluent disposal, and provide comprehensive management and monitoring conditions.
- Possum trapping for fur in Howard and Rabbit Island forests.

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**Recreational usage** The Council forests receive significant recreational demand from the wider public. During the 2013 year, 152 access permits were issued, of which 130 were for recreational purposes (see figure below).

Borlase, Rabbit Island and Kingsland are of particular importance for their recreational value, and they are the most utilised of the estate. Passive recreation in Kingsland and Rabbit Island (walking, cycling, swimming and horse riding at Rabbit Island) are uncontrolled and open to the public subject only to fire danger and hours of darkness. Other forms of recreation (e.g. pig hunting in Borlase) are controlled by the permit system to ensure strict controls on access to avoid conflicts between users, or to protect public safety.

Tunnickliff forest is also used for similar recreational activities including cycling, horse riding and other passive uses.

At Rabbit Island, there is a large reserve on the north coast excluded from timber production solely for the purpose of public recreation (the 'domain'), plus a buffer on the west and east side of the island that is available for public entry. The domain and coastal reserves are controlled by council bylaws and the Reserves Act 1977. In response to the demands and to meet legislative requirements under the Reserves Act a Rabbit Island Reserves Management Plan has been produced and periodically updated since 1989. This plan seeks lays out

In 1994 a local equestrian organisation was given approval to lease approximately 19 hectares of recreation reserve on Rough Island. This is has been developed as an equestrian centre.

The Great Taste Cycle Trail from Richmond to Mapua via Rabbit Island

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opened in 2012, resulting in a sharp increase in the number of recreational cyclists coming out to the forest.

An additional designated in-forest route, the Moturoa Forest Trail, was developed with the Council to provide a safe trail for riders and to confine riding to areas that could be safely managed in conjunction with forest operations such as harvesting and sewerage disposal.

At the time of writing, route proofing is also being finalised for passage of the Wakefield to Hope section of the NZ Cycleway project with the intension of a short section of that route passing through Tunnickliff forest.

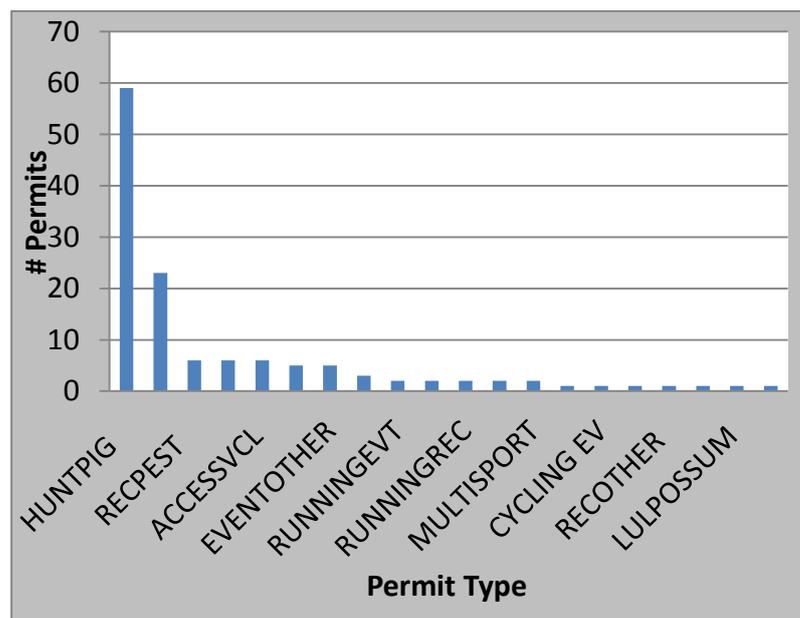
The location of Rabbit Island and Kingsland forests close to significant suburban populations means the forests are highly valued for their recreational opportunities. Rabbit Island and Kingsland public recreation is administered by the Tasman District Council via a Council Recreation Policy.

All the forests have formed and unformed legal roads, the location of which can be viewed on the Walking Access Commission’s mapping website at [www.wams.org.nz](http://www.wams.org.nz). The WAC promotes the ‘NZ Outdoor Access Code’, which outlines the rights and responsibilities of adjacent landowners, and those wishing to utilise legal roads. The Code can be found online at:

<http://walkingaccess.govt.nz/assets/store/doc/Code.final30June.pdf>.

A section in the Code specifically acknowledges the importance of obtaining an access permit to enter a forest to ensure that forestry companies have user’s contact details, and can provide information about fire risk, forestry operations and other hazards. Because Council has a general open forests policy, subject to permit, then-in-so-far as any access is needed, the use of existing formed infrastructure is strongly encouraged.

**Figure 7: Permits issued throughout the Council estate in 2013**



## 10. Environmental Risk Management

### Assessment of environmental risks

Several areas of typical forest management have been identified as posing a possible environmental risk within the Council forests. The Environmental Assessment Matrix below summarises the identified risks for the Council forests. The level of risk has been evaluated in the matrix as high ‘H’, medium ‘M’, low ‘L’, or not applicable ‘NA’.

Prior to operations such as clearfelling, land preparation and production thinning, an assessment is undertaken to quantify the risk involved in carrying out the particular operation, and steps are implemented to manage the risks

<u>Forestry Operational Activities</u>	<u>ENVIRONMENTAL VALUES/ISSUES</u>											
	Erosion & Sediment Control	Water Quality	Soil Conservation & Quality	Air Quality	Aquatic Life	Native Wildlife	Native Vegetation	Historical & Cultural Values	Landscape & Visual Values	Neighbours & other forest users	Public Utilities	Recreation Values
Harvesting	H	H	M	L	L	L	M	L	H	H	L	H
Earthworks	H	H	M	NA	M	L	L	L	L	L	L	L
Slash Management	M	M	L	NA	L	L	L	NA	L	L	L	L
Stream Crossings	H	H	L	NA	H	L	L	L	L	NA	L	NA
Mechanical Land Preparation	L	H	L	L	L	L	L	L	L	H	L	L
Burning	L	L	L	H	L	H	L	NA	H	H	L	H
Planting	NA	NA	NA	NA	NA	NA	L	L	L	L	L	L
Tending	NA	NA	NA	NA	NA	NA	NA	NA	NA	L	L	L
Fertiliser Application	NA	H	L	L	H	NA	L	NA	NA	L	L	L
Agrichemical Use	NA	H	L	L	H	L	H	NA	L	H	L	H
Oil & Fuel Management	NA	H	L	NA	H	L	L	NA	L	H	L	H
Waste Management	NA	L	L	NA	L	L	NA	NA	L	L	NA	H
Forest Protection	NA	L	NA	NA	L	L	L	NA	NA	L	NA	L

**Hazardous substances management**

Hazardous substances are any substances, which may cause adverse environmental impacts and/or injury or health problems if incorrectly handled or used.

The hazardous materials which may be used within Council forests are:

- Pesticides;
- Herbicides;
- Fuels and oils;
- Fire retardants;
- Surfactants.

Transportation, storage and labelling of these hazardous materials must all comply with the provisions of the Health and Safety Manual, which is maintained under ISO 9001 certification and incorporate legislative controls under EPA and NZS 8409:2004 Management of Agrichemicals code of practice.

Furthermore, the forest manager is committed to reducing the use of hazardous substances as much as possible. This involves use of alternative methods for the control of weeds, pests and diseases where these are effective and efficient. The use of fuels and oils is minimised where possible. Chain bar lubricants are bio-oils. Fire retardants are only used when required and surfactants are only used to make more efficient use of specific herbicides.

**FSC highly hazardous chemicals**

There are four agrichemicals that have been classified ‘highly hazardous’ by FSC that are used in forestry and conservation operations within PF Olsen certified forests. Special derogations to continue usage subject to conditions are maintained by PF Olsen.

**Table 15: Highly hazardous chemicals used by PF Olsen**

<b>Active ingredient</b>	<b>Purpose</b>	<b>Common usage</b>
Terbuthylazine	Gorse and grass control to aid establishment	Once per rotation
Hexazinone	Bracken, grass, pampas and blackberry	Some specific sites, once per rotation
Sodium cyanide	Possum control (ground-based)	Rare
Sodium Monofluoroacetate (1080)	Possum control	Rare; only by Animal Health Board to date

**Wilding spread risk**

Some conifers have a higher predisposition for uncontrolled spread than others. On some sites, Douglas-fir can be a problematic species in terms of uncontrolled spread.

Douglas-fir is currently planted in areas of Borlase, Sherry River, Tunnickliff and Howard forests. It is likely that future crops in Howard forest will be predominantly Douglas-fir rather than the incumbent radiata pine, as the radiata has not fared well under the occasional snow damage suffered at these higher altitude sites.

The risk of uncontrolled spread from these forests has been assessed, and it is considered manageable for the following reasons:

- Borlase, Sherry River, Tunnickliff  
Generally these forests are surrounded by productive landuses and are at lower altitudes, so the risk of Douglas-fir spread is considered low.
- Howard  
Though a higher risk than the other forests due to elevation and non-productive adjacent landuses, it is considered manageable to replant the forest in Douglas-fir as long as appropriate monitoring is in place, and if required, control is carried out.

Douglas-fir stands that are on the forest boundary, are on 'take-off sites', or are not surrounded by an intensive land use (e.g. at least semi-intensive pastoral farming, or forestry) will be subject to 5 yearly monitoring once the Douglas-fir stand has reached coning age, expected to be between 10 and 15 years. The planting of a lower spread risk species (e.g. *P.radiata/P.attenuata* hybrid) will be considered as a buffer along boundaries where wilding risk is assessed as being high at time of replanting.

## 11. Commercial Crop Establishment and Silvicultural Operations

### Introduction

Forest operations are implemented to ensure a good quality crop and maximum growth. These operations include land preparation, establishment, weed control, pest and disease control, fire protection, pruning and thinning, and general property asset maintenance.

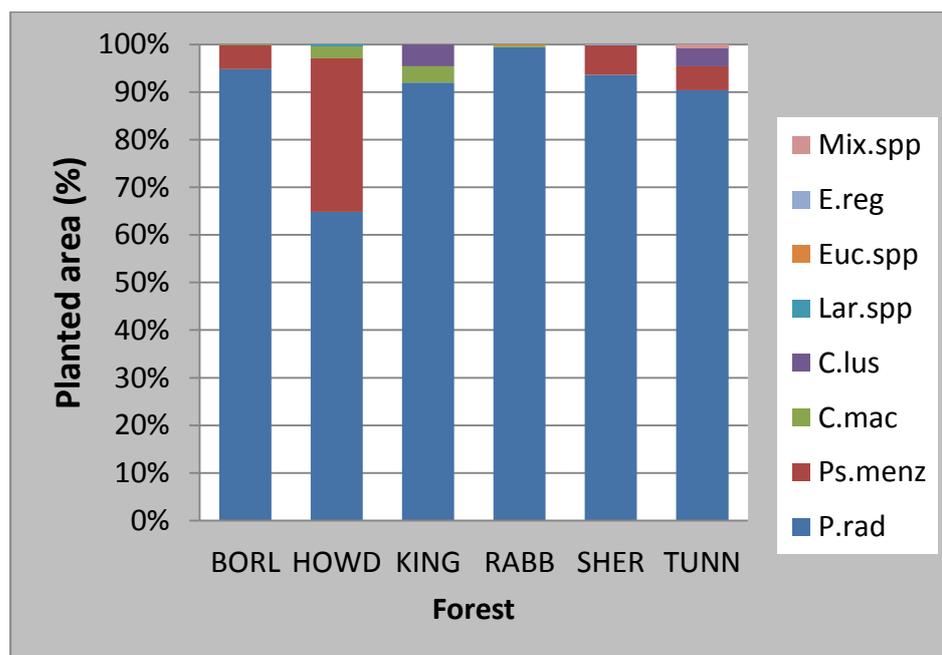
### Crop species

Radiata pine, when intensively managed, will produce a range of different log types suitable for various processing options. The pruned butt log can be used to make knot-free veneer or decorative timber. The unpruned logs can be used for structural timber, for veneer or for feedstock for fingerjointing. Small logs and those with defects and excessive knots can be used for pulp and paper, MDF and other reconstituted wood products.

Radiata pine is the most common species processed in New Zealand and export markets are well developed for both finished products and logs. It is also the main focus in terms of research and development which has resulted in improvements in growth, form and wood characteristics as well as development of a range of finished products, building codes and timber standards.

Radiata pine is the predominant species planted within all the Council forests; however there are small areas of Douglas-fir, macrocarpa, *Cupressus lusitanica*, larch and *Eucalyptus* species.

**Figure 8: Planted area by species**



**Pre-establishment forest flora and fauna**

While a plantation crop is generally likely to confer beneficial habitat buffering rather than cause adverse effects, prior to re-establishment of the tree crop a review will be conducted to identify whether there are any rare, threatened or endangered species of flora or fauna within the area to be planted and what, if any, adjustments in planting may be required to accommodate improved environmental outcomes in the subsequent rotation. This may include the extension of an existing wildlife corridor or riparian area by increasing setbacks at the time of crop replanting. These considerations are covered by the afforestation checklist and riparian rules contained within the EMS.

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**Land preparation**

Clearfelling sites should be prepared for replanting by raking clearfell stem and branch waste into windrows and by the aerial application of herbicide as a pre-plant desiccation. Where skid sites and access tracks are planted ripping is essential to break up compaction.

Oversowing clearfell sites with grasses has proved effective in some trial areas on Rabbit Island in reducing brush weed competition and radiata pine regeneration competition with young planted trees.

Land preparation prescriptions are included in Appendix 1

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**Establishment**

There is re-establishment planned within the Council forest estate during the period of this management plan, following harvesting of existing crop. Establishment will aim to use high quality treestocks suitable for the site and market, targeting stock with high wood density. These will be investigated at time of establishment.

Since 1992 genetically improved radiata pine planting stock of Growth and Form (GF) factors ranging from 16 to 30 has been used at stockings of 600 to 900sph. In addition areas of Douglas fir and macrocarpa and lusitanica cypress have been established at 1200sph.

Establishment prescriptions are included in Appendix 1

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**Releasing**

Post planting releasing has generally been undertaken in the spring following planting, by a 2 metre diameter spot herbicide application to minimise initial weed competition.

Broom invasion of re-establishment sites has occurred increasingly and has been controlled by aerial releasing in summer following planting.

Releasing prescriptions are included in Appendix 1

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## Tending

### **Borlase**

Most of the older radiata pine was planted at 1,200 stems per hectare and has received a single thinning to 450 stems per hectare. Some areas have been pruned. Generally pruning has been erratic and now most of the forest is unpruned.

Radiata pine is now re-established at about 900 stems per hectare. Following a review of silviculture regimes it has been decided to abandon pruning altogether and concentrate on production of high density unpruned sawlogs through a framing regime.

Thinning of the young Douglas-fir areas will commence in 2014.

### **Howard**

Tending of the radiata pine tree crop has now been completed with the majority of stands pruned, and thinned to 350 stems/ha. The Douglas-fir has virtually all been thinned to a final crop stocking of 400-500 stems/ha. Occasional snow damage has reduced the value of some radiata pine stands and replacement with Douglas-fir should be considered following harvesting however such a decision when the time comes needs to be informed by the results of boundary monitoring for wilding spread and the capacity to devise suitable spread containment buffers using species such as *Pinus attenuata* or a band of 'sacrificial' radiata.

### **Kingsland**

All tending of crops planted prior to 2010 has now been completed with the majority of the radiata pine having been pruned, and thinned to 350 stems/ha. Tending of stands planted following harvesting will be managed on a similar regime.

### **Rabbit Island**

The current tending regime is two pruning lifts, and thinning to waste to 375 stems/ha.

Historically, production thinning has been part of the management strategy at Rabbit Island but has not been practiced for at least 20 years. Changing log prices or a cost-effective harvesting solution may make it viable again in the future.

### **Sherry River**

Nearly all of the radiata pine has now been pruned in two lifts and thinned to 375 stems/ha. The Douglas-fir has been thinned to 400-500 stems/ha.

### **Tunnickliff**

Nearly all of the radiata pine has now been pruned in two lifts and thinned to 375 stems/ha. The Douglas fir and minor species have been thinned to waste to 400-500 stems/ha, with some pruning in the minor species.

Tending prescriptions are included in Appendix 1

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### Tree nutrition

The soils in the Council forests are deficient in one or more nutrients. The most common nutrient deficiencies are:

- **Nitrogen** – Generally west coast sands in the North Island and the Canterbury Plains, West Coast and Nelson regions in the South Island.
- **Phosphate** – Upper North Island, Marlborough and West Coast have marginal available phosphate concentrations. This is often associated with clay soils.
- **Magnesium** – Magnesium deficiency is a particular problem of the Central North Island and is associated with the phenomenon known as mid crown yellowing where the middle of the tree crown turns a yellow colour. Heavily pruned trees and some seedlots are more predisposed to the deficiency than others.
- **Boron** – Boron deficient trees can suffer dieback from the terminal buds and this symptom is closely associated with moisture stress and drought. Trees growing on the drier East Coast of both Islands and on the pumice soils of the Central North Island are prone to boron deficiency.

Foliar sampling throughout the forestry plantations has revealed that boron levels are marginal to low for tree growth. Nitrogen is found at marginal to low levels in most stands at Borlase and Rabbit Island forests and phosphate is found at marginal levels in some stands on these forests.

Foliar samples will be taken if nutrient deficiency symptoms are seen or expected. Fertiliser will only be applied if the health and the growth of the trees are significantly affected.

The major nutrient concern is the generally marginal levels of the trace element boron. Tree stem deformities and crown damage are visible in some older stands and the damage is almost certainly the result of boron deficiency particularly during dry years.

Nitrogen deficiencies are noted particularly at Rabbit Island in untreated stands. Trials have been undertaken in the past and it has been proven to be economically viable to apply nitrogen to these stands. With the commencement of Biosolids operations in 1997 (sewerage treated to USDA class Aa and also a rich source of nitrogen) a large proportion of stands have now received at least one application, equivalent to 300kg/ha N. The effect on tree growth, environment, and wood properties from Biosolids operations are monitored annually through a large scale trial in Cpt 11.04.

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This trial has been measured annually and at age 22 the increase in volume in the plots where bio-solids has been applied has been about 20% over the control. Ongoing measurement of this trial is planned. At this stage Biosolids applications are sufficient to mean fertiliser applications of nitrogen are not necessary.

Some trees throughout the various forests exhibit signs of upper mid crown yellowing (UMCY) but this tends to be transient showing up during the growing season particularly during dry years when trees are stressed and subsequently disappearing. The cause of this problem is thought to be magnesium deficiency caused by a K:Mg imbalance. The condition is often transient and not considered serious. It is possible that applications of Magnesium can help, but this can be expensive and needs to be justified.

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## 12. Forest Inventory, Mapping and Forest Records

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### **Inventory**

Forest growth and development is monitored through forest inventory. Forest inventories providing stand information are required at different times and for different reasons throughout the life of the rotation. PF Olsen have procedures for each of the following four types of inventory to be applied on the Council forests:

- Pre-assessment: for silviculture rate setting and validating operational timing vs. silvicultural targets;
  - Quality control: to check contractor’s performance and update stand records;
  - Mid crop: to collect measurement inputs for growth modelling;
  - Pre-harvest: to obtain estimates of recovery by log grade at time of harvest.
    - Pre-harvest inventory must be undertaken within 12 months of a stand being harvested. Pre-harvest inventory must be undertaken following the Plotsafe method. Existing PSP’s must be re-measured every three years.
    - All inventory data is to be collected to achieve results with a Probable Limit of Error (PLE) for basal area of within +/- 10% at the 95% Confidence Interval.
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### **Mapping**

All of the Council forests have been digitally mapped, which will require updating from time to time as the forest changes.

The digital data is retained, processed and managed on PF Olsen’s GIS (Geographic Information System) to an accuracy fit for purpose.

Stands are remapped from new aerial photography around age four (when the trees are visible on aerial photography) to accurately determine boundaries and areas (target  $\pm 3\%$  of actual), and again around two years prior to harvesting to assist with harvest planning. Other mapping is done as required

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### **Forest records**

Forest records are essential in monitoring the forest operations by providing a historic perspective to the physical condition of each stand.

Council forest estate records are maintained on PF Olsen’s FIPS system (Forest Information and Planning System). These record systems allow for fast retrieval of information, production of reports and statistics and provide a comprehensive audit trail.

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Forest records are essential to understand the status and condition of forest stands, reserves, and important fauna species as well as the retention of inventory data and operation monitoring data.

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**Permanent sample plots**

PSP’s in Council forests have been established solely by the New Zealand Forest Research Institute (now Scion) for use in their national growth modelling programme. They are established within a stand and periodically re-measured, thus giving an indication of growth characteristics within the stand.

All PSP’s must be measured following Scion Trial Management Plan methodology and timing schedules (usually every 3 years). PSP’s which are lost due to clearfelling should be replaced with other representative plots.

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**Forest trials**

Several long term Forest Research (Scion) trials are located in Council forests. All existing trials should be tended and measured as required in the trial management plans. The various trials are detailed in table 16 below.

As existing trials are clearfelled new trials should be instigated to replace them. Further Permanent Growth and Yield sample plots are proposed to be established as higher GF rated planting stock has been used throughout the forests since 1992.

**Table 16: Summary of Current Research Projects**

TRIAL	Cpt/Stand	Trial start date
<b>Permanent Growth and Yield</b>		
NN 461;85-Rabbit Island	6.04 and 10.01	1985
NN 461;89-Rabbit Island	1.03,4.03,4.04,8.03	1989
NN 435/2-Howard	Cpts 1,2,3	2004
NN 435/1-Sherry	Cpts 1,2,3	2004
NN 436/0-Kingsland	Cpt 1	2004
<b>Nitrogen Fertilising</b>		
NN 434-Rabbit Island	6.02	1976
<b>Bio-solid Application</b>		
Rabbit Island	11.04	1987

Note: All projects will finish at clearfell.

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## 13. Harvesting Strategy and Operations

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**Harvesting strategy** The objective of the long term cutting plan is to produce an even flow of timber with rotation ages no less than 25 years for unpruned stands and 27 years (preferably 30 years) for pruned stands. The ultimate objective is to achieve a non declining annual volume cut from the forests with an average stand rotation length of 30 years.

The current cutting plan for the Council estate is set for the clearfelling of 20-24,000m<sup>3</sup> of timber per annum increasing steadily in the long-term up to 130,000m<sup>3</sup>/year in 2035 after which it will drop to a third before repeating the approximate cycle pattern. Rotation ages are expected to climb throughout the Council forest estate from age 25 currently to age 30.

As a plantation with a non-normalised age-class structure, the harvesting strategy employed across the Council forest estate is to harvest the forest or constituent stands as close as possible to the optimum economic age as practical subject to the additional caveat that the resource is to be managed to be a more or less continuous operation to the extent possible within the age-classes present.

Of importance in this assessment is the actual growth of the tree crop, the market for the wood at the time of the harvest and the outlook then and for the near future. These factors, together with logistics such as the availability of suitable harvest contractors and the requirements of resource consents, will determine the actual harvest time.

At present Rabbit Island is the only forest with active harvesting however a small block in Kingsland will be due for harvest in a few years time and planning will need to start for that soon.

Except for Rabbit Island where groundbased (wheeled or tracked) systems will be used for tree extraction, cable hauler systems will dominate in the other hilly forests.

Specific harvesting expectations are outlined in Appendix 1.

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### **Yield tables**

Yield tables have been derived for each crop type from growth models developed using the StandPak software package. Quality control, mid-rotation and pre- harvest inventory data is used to calibrate the growth models. Yield tables have been generated from crop type growth models using the Nelson/Marlborough (NM90) base Growth Model.

Yield table predictions have also been confirmed against actual yields from clearfelling operations undertaken at the respective forests or nearby sites of a similar nature.

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**Getting harvest ready**

Forward planning is essential when considering harvesting activities. Harvest planning inclusive of pre-harvest inventory should ideally commence 2 years before harvesting to enable roading infrastructure to be developed and any resource consents, archaeological surveys, etc. to be undertaken. This reduces the chance of hold-ups to the commencement of harvesting, which can be costly when log prices are fluctuating.

Harvest planning is conducted within a detailed structured framework controlled within the PF Olsen FIPS system. Planners are guided through a total of 100 elements involving environmental, cultural, community, infrastructural, and safety issues that must be addressed as well as direct operational and economic considerations, prior to the issuing of final prescriptions.

In the case of the Council forests where community groups are particularly active in undertaking ecological restoration projects within Kingsland and Rabbit Island forests, as well as construction and regular use of recreational assets, close liaison will be maintained to ensure the activities and needs of these groups are integrated as well as possible into the harvest planning process.

Open dialogue with these various parties will aim to ensure that the best achievable results are obtained in terms of protecting the high value reserves from short term operational or long term adverse influences from the plantation operations and to protect the gains arising from their efforts.

Harvesting operations will be undertaken by contractor and supervised by the forest manager.

The harvest plan map for the 2014 Rabbit Island operation shown in Map 2 below.

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## 14. Property Management and Protection

### Statutory pest obligations

Pest management within the Council forest estate is subject to statutory obligations under the Regional Pest Management Strategy (RPMS) administered by the Tasman District Council. The current RPMS covers the 2012 to 2017 period.

The RPMS applies to both pest plants and animals and categorises them in terms of management objectives. The categories are summarised in the table below.

Across all categories, the land occupier (for private land) is considered the exacerbator therefore is liable for the control measures required.

**Table 17: RPMS Statutory pest regulations**

Pest Category	Pest Management Goal	Strategy Rule*
<b>Total Control</b>	Eradication	Destroy all adult and juvenile forms
<b>Progressive Control</b>	Reduce density and distribution	Destroy all adult and juvenile forms/report sightings of animal pests
<b>Containment</b>	Prevent spread to new areas or neighbouring properties	Destroy all adult and juvenile forms*, council will promote and encourage control, avoid propagating or distributing pest
<b>Boundary Control</b>	Prevent spread to land that is clear, or being cleared of, the pest	Destroy all adult and juvenile forms within 5m/10m/20m/50m* of a boundary, avoid propagating or distributing pest
<b>Regional Surveillance</b>	Banned from sale/propagation/distribution	Avoid propagating or distributing pest
* Specific zones apply for some pests. Full details of classifications and obligations are listed in Sections 4 - 9 of the Pest Management Strategy.		
The full list of plant and animal pest species are contained in Appendix 7		

### Animal pest control

The PF Olsen Integrated Pest Management provides guidance on application and execution of the PF Olsen Ltd Environmental Management System (EMS) for pest control and chemical use.

The main animal pest in the Council forest estate that is also a commercial risk is the introduced possum. Possums attack the growing tips of both plantation and native trees, causing stem malformation and die back. Possums are also a threat to neighbouring property owners who are farmers as they can carry and spread tuberculosis to domestic stock.

Other commercial pests include rabbits and hares at the time of establishment.

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Animal pests in the Council forests will be controlled using ground control methods as required, which prevent impacts on non-target species. The forest manager will coordinate operations with organisations such as the Regional Council and the Department of Conservation to achieve effective and efficient control within the forest area and on neighbouring land, where required.

Local groups, the Rabbit Island Trapping Group and “Native Bird Recovery – Richmond are actively trapping for ecological pests, primarily rats and stoats in the Kingsland protected ecosystems and at Rabbit Island around the bird nesting zones. Close liaison will be maintained to support the efforts of those groups and their objectives as defined and established in conjunction with Council reserves management.

In addition, recreational hunters are encouraged in Borlase and Howard forests to help control ungulate pests such as deer and pigs.

**Pest weeds**

Parts of the plantation forests in general are subject to common invasive weeds such as broom and gorse and pampas which are subject to boundary or containment control requirements under the Regional Pest Management Strategy (RPMS). Forest boundaries will require periodic inspection and treatment where such weeds occur.

In addition, substantial voluntary effort (‘Keep Richmond Beautiful’ group) has and continues to be directed and further supported by professional contractors and significant funds from the Council reserves management department to control serious ecological weeds infesting protected ecosystems in Kingsland and other areas. Key targets for these efforts and ‘Old Mans Beard’, Banana Passionfruit, *Bomarea caldasii*, Hawthorn, Tree Privet and English Ivy to name a few.

Much progress has been made but an important aspect of ongoing integration between the commercial forest manager and these groups and Council’s reserves management will be to try to ensure good control of weeds at the marginal interface between the plantations and (particularly) the HCV protected ecosystems to preserve the gains being made within the reserves by these groups’ efforts.

**Douglas fir wilding risk**

All Douglas fir plantations are now within the age bracket when coning will be present. The Howard plantations are identified as presenting the greatest risk of creating an unwanted and difficult to control spread risk. Within the term of this plan an assessment of evidence of spread is required and if necessary early control of any seedling presence within adjacent native forest.

**Disease control**

Diseases, which can affect the forest trees and adjacent native vegetation, are monitored throughout the year by the forest manager, and once a year by a professional independent forest health assessor. Most diseases cause little damage and do not require control.

The only disease of note is *Dothistroma pini*, a fungal pathogen which causes defoliation. This fungus is controlled using a copper-based fungicide, but only when the infection reaches a critical level. *Dothistroma* infection can also be controlled through silviculture by timely thinning and pruning operations, which increases air movement and lowers humidity levels.

Susceptibility to infection is largely genetic, i.e. some seedlots and/or individuals within seedlots are more prone than others. Susceptibility to infection tends to be restricted to trees younger than age 15 but in moist gullies mature trees can be badly affected. *Dothistroma* infection can lead to significant growth reductions in diseased trees and in some cases repeated infections can kill the trees.

*Dothistroma* control is carried out at Sherry, Howard, and Borlase forests.

Some minor areas of *Cyclaneusma minus* infection, another needle cast fungus infection, have been noted. Again the infections can lead to significant reductions in growth of infected trees. The incidence of *Cyclaneusma* is very low and currently has negligible impact.

The only other disease of note are small localised areas of tree root rot caused by *Armillaria species* which have attacked trees at Rabbit Island, Borlase and Kingsland following damage by lightning strike. These very small areas are not a source of concern.

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**Operational  
recommendations**

1. Crop health and condition must be regularly assessed. Any signs of poor growth, nutrient deficiency, disease, and damage must be investigated and samples and/or information sent to the relevant authority if further information and recommendations are required.
2. The Forest Health Officer contracted to the Forest Owners Association visits the various forests annually and reports on their health status. This annual independent forest health inspection should be continued.
3. An annual round of foliar sampling should be undertaken with sampling concentrated in stands aged 3 to 10 years and any other stand which shows signs of deficiency.

Treatments for stand nutrient deficiencies and disease should be in line with the operational prescriptions in Appendix 1

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**Fish passage**

Within the term of this plan a survey of forest culverts is required to be completed and where required a programme implemented to rectify any culverts and crossings that currently obstruct fish passage in natural streams and rivers.

Riparian values will be accorded protection in relation to the rules hierarchy defined by their REC classification and the associated management prescriptions and guidelines.

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**Protected ecosystems, reserves and species**

PF Olsen’s Conservation and Ecology Manual provides detailed guidance and specification on the application and execution of ecological management targets and actions, as are broadly laid out in the Environmental Management System (EMS). Programs for ecological management are specified and monitored in FIPS Ecological Management module. The high-level priorities for each of the forests are outlined below. See also Section 9: High Conservation Value Forests.

**Borlase**

The focus in Borlase is to establish photopoints within PRIF-02 to monitor long-term changes in the podocarp/beechness health and vitality. There are also several weed species identified on the edge of this stand (wattle, gorse, blackberry and old mans beard) that need to be removed.

**Howard**

The indigenous forest areas within Howard are representative of large areas in the ecological district. The highest priority in terms of ecology is to ensure the grazier’s stock is confined to pasture areas within the plantation forest, and are excluded from all natural areas. Areas of pig and deer damage are also evident; therefore allowing permitted hunters access to the forest will encourage the development of a more complex forest understorey.

Photopoints established within representative areas of each indigenous stand will allow the change in vegetation health and composition to be monitored.

A more focused ecological survey of WETL-01 may highlight specific areas for management of this area, but the highest priority for the site at present is to remove the grazing.

**Kingsland**

Significant work is already being carried out within the forest by local community conservation groups. It will be important to ensure that communication is maintained with these groups to ensure that ecological management undertaken is complementary especially in terms of the edge interface between plantations and the protected ecosystems.

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Both banana passionfruit and old mans beard had been identified in a stand of secondary forest (SECF-02) in the Jimmy Lee Creek catchment, and is likely to occur in other natural areas. The distribution of these weeds and also the sole local source of *Bomarea caldasii* (climbing alstroemeria ) should be ascertained, and a control program developed.

Photopoints established within representative areas of each indigenous stand will allow the change in vegetation health and composition to be monitored, particularly in sites where weed control will be undertaken.

Western weka *Gallirallus australis australis* (declining; Miskelly et al 2008) appears to be increasing in numbers in the Nelson region, with populations known within Kingsland. Community groups implementing pest control work will aid the weka recovery. Direct liaison with the Nelson area Department of Conservation office should be undertaken to develop a long term strategy to manage weka in the forest, in conjunction with any review of the Council Dog Control Bylaw. Uncontrolled dogs are likely the biggest threat to weka.

#### **Rabbit Island**

The Rabbit Island coastal ecological areas are unique and will require specialist ecological surveys in the areas not already described. As well as vegetation, the forest is also one of several internationally important sites for shorebirds (oyster catchers, stilts, plovers, sandpipers).

Community conservation groups are already carrying out pest control work in several shorebird nesting areas. It will be imperative to liaise with these groups to ensure best allocation of resources.

The Tasman District Council have commissioned ecological reports on a wetland and *Leptospermum* stand (WETL-01 and LEPT-01), in which several management recommendations have been made:

- WETL-01
  - Control weeds (pines, gorse, blackberry, crack willow, old mans beard) within the wetland and immediate margin;
  - Fell the pine crop away from the wetland;

Implement a replanting setback to create a buffer for the wetland.

- LEPT-01
  - Control wilding pines, gorse, broom, Spanish heath and iceplant;
  - Exclude public vehicular access to the site;
  - Implement sensible replanting boundary following harvest.

There are parts of the island that are affected by old mans beard that may still be isolated enough to contain and eradicate. A full survey would identify the areas affected and provide a case for control.

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**Sherry River**

The Sherry River forest ecosystems are degraded and poor examples of their forest type. The areas, although small, will benefit from stock exclusion and any pest control carried out over the plantation will confer benefits to the reserve areas.

The road edge along the bottom of an area of near-virgin forest (PRIF-02) has several weed species present (blackberry, gorse, old mans beard, Spanish heath) that would be simple to eradicate.

**Tunnicliff**

The 12.9 ha PRIF-01 stand in Tunnicliff forest is a hardbeech / softwoods forest with a significant presence of totara. Passionfruit and Old Mans Beard are both present along with hawthorn. It is desirable that a start be made on these weeds in the block provided this can be achieved without diverting resources from the Kingsland and Rabbit Island efforts. An initial start with the removal of wilding pines should be achieved.

**Ecological equivalence**

The area of reserves meets the NZ National FSC Standard specification of 5% by forest and 10% by Ecological District, except for Rabbit Island forest where there is a 'within forest' ecological reserve total of just 1.1%;( 90.3 hectare shortfall) and an aggregated total across the Group Scheme forests in the Motueka Ecological District of 9% (11.4 hectare shortfall).

Under the FSC NZ Standard shortfalls in reserve area can be made up by an 'ecological equivalence' investment into other protected ecosystems within the estate, or in other parts of the estate in other Ecological Districts or in other party's lands within the Ecological District. The "ecological equivalence' value has been benchmarked and calculated against the average annual spend of the Department of Conservations 2013 Annual report and would amount to just under \$1000/annum.

This amount is already being substantially exceeded by the combined inputs of the Council's reserves management team and the sums spent providing support to the voluntary community restoration groups.

**Long term restoration objectives.**

The 'Keep Richmond Beautiful' group and the 'Waimea Inlet Forum' have both signalled a desire to see additions to the current reserves network within the Kingsland and Rabbit Island forests respectively.

**Kingsland Forest:**

Along the peri-urban margin of Kingsland forest there are Cypress plantings that form a break in and otherwise reverting indigenous cover extending across the frontal margins between the two protected ecosystem riparian reserves.

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The idea is being raised that upon harvest a portion of the Cypress stand be retired to enable the formation of a complete native forest linkage. Similarly it has been proposed that the riparian areas in Jimmy Lee reserve and Reservoir Creek area be extended to complete corridors to the ridgeline. The areas of forest involved, (about a hectare in the case of the foothill/cypress linkage), is not great. It has been recognised that given the current age status of the crop, any decision will be well beyond the term of this plan, and ultimately will need to be assessed in terms of maintaining harvesting access feasibility for the plantation crops as well as the conservation objectives. However the objective is recorded to ensure it remains in view for the long term and a map of the proposal is included in Appendix 10.

**Rabbit Island:**

Currently the plantation estate is often planted right to the coastal margin. There has been some public interest expressed in seeing the plantation boundaries pulled back to the statutory 50m required under the TRMP where plantations are in the Coastal Marine area which is the case for these areas. Removal is not a statutory requirement in this case as these forests were legally established prior to the introduction of the RMA and thus 'existing use' rights apply and there are situation where the plantation trees are providing a land stabilisation service.

However, there are undoubtedly areas where tree topple into the esturine area and associated bank destabilisation is a risk, along with the reduced wildlife opportunities available when plantations extend right to the waters edge.

It has been proposed that there be a formalised process for liaising with the Waimea Inlet Forum to:

- Review the coastal margins to establish those areas suitable or otherwise for plantations setback,
- The priorities for those deemed suitable.
- The scheduling of such areas in advance of harvest to enable organisation of resources (plants and money) to enable restoration after harvest.

In the immediate future the first task is to establish whether or not such a proposal can be authorised under the legislation under which Rabbit Island forest and reserves were created and secondly whether such an ecological restoration proposal would subject the general ratepayer to ETS deforestation liabilities.

**Fire prevention and control**

With the weather patterns normally experienced in New Zealand during the period late spring/summer, fire can be a real threat to the forest. This can be minimised by:

1. Having an effective fire plan;
2. Active prevention measures which include restrictions on allowable access, fire prevention signage, publicity when fire danger prevails, access to adequate water sources, constructing and maintaining firebreaks, and selective forest grazing to reduce fuel within stands;  
  
Public use of Rabbit Island and Kingsland forests as well as flare-ups from the Eves Valley landfill pose the most significant fire danger. Continued liaison with Council Community Services and Engineering Departments is required to help protect the surrounding forests.
3. Effective detection systems which includes good communication systems, mapping, and fire plan alert procedures;
4. A close link with the relevant fire authorities, these being the Waimea Rural Fire Authority with respect to all forests except for Howard Valley where DOC is the authority. All the forest manager's staff and contractors should receive adequate fire training and be able to provide backup to the fire authority should it be required.
5. Good forest management that recognises the influence of terrain, roading network and accessibility, and fuel build-up from silvicultural practice. Controlled burning as a management tool will be avoided unless absolutely necessary.
6. Regular maintenance of fire-breaks, fire ponds and road signage.

**Fire authority responsibilities**

The legal responsibility for fighting forest fires lies with the respective territorial land authorities where the forest is situated. In the case of the Council forests the Rural Fire Authority (RFA) is the Waimea Rural Fire Authority and DoC for the Howard valley.

In the event of a fire that starts within the forest, the RFA is responsible for attending and providing the resources to extinguish the fire. Where a fire starts outside the forested area and moves into the forest, the RFA has recourse to the Rural Fire Fighting Fund to compensate for fire fighting costs.

As Council is part of the RFA, all forest-level information prudent to have on-hand in the event of a fire is available to the RFA by default. This information includes forest access, the location of water points and fire breaks, and neighbour contact details.

**Fire insurance**

With regard to the location of the forest and the high public activity around the fringes, there will always be the potential for fire. If a fire originates within the forest, the owners will ultimately be liable for suppression costs. A major fire may cost many thousands of dollars to extinguish, with the main costs being the use of heavy machinery, helicopters, and manpower.

The Council forest estate is currently insured as below; Cover is reviewed annually.

<b>Tree Crop:</b>	Full replacement value based on most recent tree crop valuation
<b>Re-establishment:</b>	\$                    ha, depending on forest
<b>Public Liability:</b>	Councils own cover of \$
<b>Fire Fighting:</b>	\$                    extension to PL cover to meet requirements of Forest & Rural Fires Act

**Public liability insurance**

In the case of fire spreading from a Council forest onto adjoining land, Council could be liable for the fire fighting costs and any damage to property.

The Council has public liability insurance cover to the value of \$                    , to indemnify against unforeseen adverse activity, events or fires, both within the forest area and adjoining land tenure.

## 15. Monitoring

### Introduction

To ensure that the management objectives identified in this plan are being achieved, various monitoring exercises outside normal operations management have been developed. Monitoring results are summarised and reported to Tasman District Council as and when required and are also, where appropriate, made publicly available in aggregate for the Group Scheme through the PF Olsen website.

### Values monitored

Management inspections are completed regularly during operations and periodically between times to monitor all aspects of the forest growth, health and conditions. The findings of the inspections are detailed and, where appropriate, summarised on the PF Olsen FSC website. The full monitoring framework implemented and applicable to the Council forest estate is tabulated below.

<b>Environmental Process Monitoring Framework</b>					
<b>Monitored Element</b>	<b>Include ✓</b>	<b>Components</b>	<b>Data Source</b>	<b>Data medium</b>	<b>Reporting / Website frequency</b>
Chemical usage	✓	A.I usage/ Area overuse	operations supervisors	FIPS Form	On demand / annual
Consultation activity	✓	Complaints / operational records / business partner engagement	operations supervisors & planners	Form	Annual / annual
Environmental incidents	✓	Incident number / categories	operations supervisors	FIPS Form	On demand / annual
Flora & fauna	✓	Species & Status frequencies/ new finds	operations supervisors, public, crews	FIPS Form	Annual / annual
Forest estate structure	✓	Area (plantation & Protected ecosystem)/ age-class/ species/forest type/protection status	management plans/stand records	FIPS stand records	On demand / annual
Forest growth	✓	Growth / mortality / quality	contractors	FIPS / PSP protocols	Periodic-annual – not on web
Forest health	✓	Disease & health	National Forest surveillance program <sup>1</sup>	document	Periodic-annual – not on web

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<sup>1</sup> Forest health inspections are undertaken annually, by an independent specialist forest health assessor, through the NZ Forest Owners Association forest health scheme.

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FSC membership	✓	Block/ location/name	FIPS register	FIPS client database	On demand / annual
Health and safety statistics	✓	LTI / accidents & incidents	operations supervisors	FIPS	Monthly/ annual
Internal Audit CAR activity	✓	Frequency * category	auditors/ees	FIPS Form	Annual / annual
Log production	On harvest	Total logs/ FSC markets	log docketts	Woodtrack	On demand / annual
Operational monitoring	✓	Audit trends/cause analysis	operations supervisors	FIPS Form	Monthly / annual
Pests	✓	RTC / kill returns or other	supervisors /contractors	FIPS	Annual where relevant
Protected ecosystem condition	✓	Photopoint monitoring	contractors/ supervisors	To be established	Tri-annual if restoration initiated
High Conservation Value forests	✓	Condition trends/photopoint monitoring	contractors/ supervisors	To be established	Annual
Recreational & non-timber	✓	Permits issued	branch offices / forest security	FIPS Form	Annual / annual
Resource consents	✓	Number/compliance	operations planners	FIPS	6 monthly / annual
Stream monitoring	✓	Clarity +/- other specific	supervisors /contractors	Spreadsheet	Monthly / annual where relevant
Environmental training	✓	Courses, numbers, names	staff	FIPS	Annual/as relevant
Client satisfaction	✓	Post-operation client survey	clients	Survey form	Post-operational /annual
Social survey	✓	Demographics, values, work conditions	contractors	Survey form	5 yearly/annual

**Financial**

Budget versus expenditure is extracted from the PF Olsen FIPS system and presented in report form every 3 months to the Council. This information is not made public.

**Social**

Consultation with stakeholders has been undertaken and constant feedback from these stakeholders (and others as they become apparent) is monitored. This includes actions undertaken to resolves disputes and issues.

## **16. Future Planning**

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### **Introduction**

This plan pertains to the management of the Tasman District Council forests and will be adhered to for the next 5 years. Any deviation from this plan will be justified only on the basis that the changes do not adversely affect the environment. Any changes which are contrary to the policies contained in this management plan require a full review of this plan.

The next review date for this plan is January 2019.

The forest management plan is used for both medium and long term planning.

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### **Operation plans**

For the short term an Operations Plan and associated budget is used. That operational annual plan is prepared in accordance with this management plan and also fulfils the statutorily required operational management plan for the Rabbit Island Plantation and management prescriptions for the whole estate. These are contained in Appendix 1. Annual budgets and work plans are subject to approval by Tasman District Council.

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## **Appendix 1: Rabbit Island Forest Management Prescriptions**

### **1. FOREST OPERATIONS**

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**Overview**

The Council forest estate is now effectively completely planted and re-establishment and silviculture confined to existing stands following clearfelling.

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**Land preparation  
(cutover sites)**

**Recommendations**

1. A December cut off must be implemented when planning land preparation programmes to allow sufficient time for weed growth and pine regeneration, prior to desiccation spraying in autumn.
2. Clearfelled sites should be excavator slash raked where slopes permit, preferably prior to desiccant spraying.
3. All skids and tracks which are to be replanted must be ripped and mounded using an excavator mounted ripper/moulder. Trees planted on these sites should then be fertilised.
4. A pre-plant aerial application of a residual herbicide to delay the onset of gorse, fern and blackberry regrowth must be undertaken in March. The pre-plant spray mix must contain the appropriate quantities of metsulphuron (currently Answer @ 500g/ha) and Glyphosate (currently Roundup 360 @ 6l/ha) with a recommended surfactant (currently Input @ 0.5% of total application in litres per hectare). Aerial applications should be undertaken using no less than 200 litres of water including product per hectare. Some mortality has been experienced at Rabbit Island with metsulphuron based products used as a pre-plant desiccation, and this product has been dropped out of the spray mix and higher rates of glyphosate used as well as 'Tordon'.
5. Grass oversowing in autumn should still continue to be an optional management tool for weed suppression. The over sown mixture should comprise Annual Rye - 8kg/ha, Perennial Rye - 14kg/ha, Fog - 4kg/ha and Cocks Foot - 5kg/ha. Grass oversowing may be undertaken on Rabbit Island in the future once existing trials of a combined Bio-solid application and oversowing are successful.

**Planting**

**Recommendations**

1. On low fertility, weedy sites planting should be undertaken at 1,000s/ha (4m x 2.5m spacing) using GF 19 to 25 radiata pine seedlings. The trees should rapidly shade out competing scrub and ensure nutrient cycling occurs early in the stands life. Planting stock with high wood density/stiffness, low propensity to spiral grain and fine branching characteristics should be used at all forests. This seedlot information is available through the GF Plus scheme.
  2. On higher fertility, clean sites planting should be undertaken at 888s/ha (4.5m x 2.5m spacing) using GF23 or better physiologically aged radiata pine rooted cuttings or seedlings. The risk of plant losses due to scrub weed competition and toppling are reduced and the better growing conditions will maximise the productive potential of this more expensive planting stock. Planting stock with high wood density/stiffness, low propensity to spiral grain and fine branching habits should be used at all forests.
  3. Radiata pine planting stock with Dothistroma resistance must be used at Borlase, Howard and Sherry forests.
  4. Douglas fir is noted to perform well on Borlase, Howard Valley and Sherry River forests. Planting of further areas should be considered on re-establishment particularly where Dothistroma will be a continuing problem for radiata pine. Macrocarpa and lusitanica cypress grow well at Eves Valley and Tunnicliff, and Kingsland forests, but canker is a risk.
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**Releasing**

Post planting releasing has generally been undertaken in the spring following planting, by a 2 metre diameter spot herbicide application to minimise initial weed competition.

Broom invasion of re-establishment sites has occurred increasingly and has been controlled by aerial releasing in summer following planting.

**Recommendations**

Species	Location	Method	Timing	Chemical	Rate
P.rad	All forests excl R.Island	Spot	Aug/Sep	Terbuthylazine/Hexazinone (Valzine)	20ℓ/ha
P.rad	Rabbit Island	Spot	Aug/Sep	Terbuthylazine (Gardoprim)	20ℓ/ha
D.fir/Mac	All forests	Spot	Aug/Sep	Terbuthylazine (Gardoprim)	20ℓ/ha
Rank Grass	All forests	Spot	Aug/Sep	Haloxypop (Gallant) added to the above	4.5ℓ/ha
Fern	All forests	Aerial	Nov	Primisulphuron (Beacon) + surfactant (Boost)	100g/ha 0.5%
P.rad Gorse/Broom	All forests	Aerial	Nov (one year after planting)	Clopyralid/Picloram mixture (Versatil / Tordon mix) + surfactant (Boost)	5ℓ/ha 0.5ℓ/ha 0.5%
D.fir/Mac Gorse/Broom		Aerial	Nov	Terbuthylazine/Oxyfluorfen mixture (Gardoprim / Brownout surfactant mix)	20ℓ/ha 1ℓ/ha

**Regime analysis**

An analysis of various tending regimes has been carried over a number since 1998 to determine the ‘optimum’ regime for each forest. This exercise should be repeated every three years, using updated costs and revenues.

The following regimes are ‘optimal’ but where cost or tree quality are an issue. the pruned regime should drop back to a framing regime.

**Tending regime**

**Recommendations**

**Borlase**

Site Index 28.0m

Basal Area Potential Low

Crops should be waste thinned only with a target rotation length of 27 years.

Operation	Age (years)	Stems per Hectare
Waste Thin	7-8	400-500

**Eves Valley**

Site Index 31.0m

Basal Area Potential High

Operation	Age (years)	Stems per Hectare
First Prune to 2.5m	4-5	450
Second Prune to 4.5m	6	400
Third Prune to 6.5m	7-8	400
Waste Thin	7-8	400

**Howard Valley**

Site Index 26.0m

Basal Area Potential Low

1. Main Regime

Operation	Age (years)	Stems per Hectare
First Prune to 3.0m	6.0	400
Second Prune to 5.6m (variable lift)	8.0	350
Waste Thin	8-9	350

2. Fall-Back Framing Regime

Operation	Age (years)	Stems per Hectare
Waste Thin	8-9	400-500

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**Kingsland**

Site Index 28.5m

Basal Area Potential Medium

Operation	Age (years)	Stems per Hectare
First Prune to 3.0m	5-6	400
Second Prune to 5.6m (variable lift)	7-8	350
Waste Thin	8-9	350

**Rabbit Island**

Site Index 29.5m

Basal Area Potential Low

1. Where Biosolids are to be applied all crops should receive two variable pruning lifts, and a higher final stocking should be utilised to control branch size. If excessive branch size becomes a problem a third pruning lift may be needed.

Operation	Age (years)	Stems per Hectare
First Prune to 3.0m	5-6	450
Second Prune to 5.6m	7-8	400-450
Third Prune	optional	
Waste Thin	8-9	400-450

2. All crops which will not receive an application of bio-solids.

Operation	Age (years)	Stems per Hectare
First Prune to 3.0m	5-6	400
Second Prune to 5.6m (variable lift)	7-8	350
Waste Thin	8-9	350

**Sherry River**

Site Index 29.5m

Basal Area Potential Medium

Operation	Age (years)	Stems per Hectare
First Prune to 3.0m	5-6	400
Second Prune to 5.6m	7-8	350
Waste Thin	8-9	350

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**Tunnicliff**

Site Index	32.0m
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Basal Area Potential	High
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<b>Operation</b>	<b>Age (years)</b>	<b>Stems per Hectare</b>
First Prune to 3.0m	5-6	450
Second Prune to 5.6 (variable)	7-8	400
Waste Thin	8-9	400

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**Nutrition and disease**

1. All stands throughout the Council forest estate must receive an application of boron at 6kg per hectare in a slow release formulation (currently Ulexite, which comprises 10% Boron, at 60Kg/ha) during the period following planting and before tending commences.
  2. Nitrogen and/or phosphate fertilising should not be considered unless economic returns can be proven. Nitrogen applications in the form of Bio-solids are undertaken at Rabbit Island where an economic benefit has been proven.
  3. Magnesium fertilising is not currently considered necessary as deficiency symptoms are at a very low level. Should deficiency symptoms become more pronounced the application of an appropriate fertiliser should be considered.
  4. Infection levels from *Dothistroma pini* will need to be assessed annually. Where infection levels reach 25% or more of a tree's living crown, aerial application of Copper Oxychloride must be undertaken. Dothistroma control operations should be restricted to stands aged 3 to 15 years and older stands in gully areas. Where infection levels are high and infection occurs regularly control measures can be anticipated to be required every 3 years.
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## 2. TIMBER HARVESTING AND MARKETING

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### Yield tables

Yield tables have been derived for each crop type from growth models developed using the StandPak software package. Quality control, mid-rotation and pre-harvest inventory data is used to calibrate the growth models. Yield tables have been generated from crop type growth models using the Nelson/Marlborough (NM90) base Growth Model.

Yield table predictions have also been confirmed against actual yields from clearfelling operations undertaken at the respective forests or nearby sites of a similar nature.

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### Cutting plans

In the current long term plan, based on the July 2008 valuation, the annual cut proposed is 20,000m<sup>3</sup> to the year 2014 then 35,000m<sup>3</sup> to the year 2024, and 130,000m<sup>3</sup> to 2035.

The forest managers also publish an Annual (short-term) Logging Plan. This plan should be referred to if further details are required.

#### Proposed Harvest Plan Ending July 2014

YEAR	Volume (m <sup>3</sup> )	Forest	Area (ha)
2009/10		Rabbit Island	
2010/11		NIL	
2011/12		Rabbit Island, Borlase	
2012/13		Rabbit Island	
2013/14		Rabbit Island	

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### Recommendations

1. The long and short term cutting plans be updated annually as further inventory and outturn data becomes available.
  2. There may be opportunities for spot timber markets to be identified and increased returns generated by harvesting certain stands outside the specified harvesting year.
  3. Log marketing must be undertaken to maximise revenues. Local mills should be given the opportunity to bid for logs. Longer term supply deals, must include clauses for periodic negotiation.
  4. Logging waste assessments must be undertaken using the Zig-Zag LIS method at one plot per two hectares.
  5. Means of increasing value recovery during logging operations such as Pruned Log Index studies, electronic log callipers, sonic testing, and contractor training should all be pursued.
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### 3. HARVESTING ROADING

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**Overview**

Rabbit Island, Borlase and Tunnickliff forests are generally well served by roads put in for previous harvesting operations. In other forests there are existing tracks put in for establishment and tending. These tracks usually have a good grade and follow ridge lines or valley bottoms. They will however require significant upgrading as width, water tabling, corner radius, and metalling are in most cases inadequate for future harvesting.

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**Roading requirements**

The main requirement of the roading plan is that roads are constructed between 6 and 12 months prior to logging. Harvesting landings and associated spur roads may be constructed at time of roadlining. This decision will depend on exposure of standing timber to wind.

The roading requirements for the 5 year period are detailed below:

**Roading Requirements for the 5 Year Plan Period**

<b>Year</b>	<b>Forests:</b>	<b>Area to harvest</b>	<b>Length of new road</b>
<b>2009/10</b>	Rabbit		
<b>2010/11</b>	NIL		
<b>2011/12</b>	Rabbit /Borlase		
<b>2012/13</b>	Rabbit Is.		
<b>2013/14</b>	Rabbit		

---

## **Appendix 2: Rabbit Island Reserve Management Plan**

### Appendix 3: Forest Legal Descriptions

Borlase	Section 49 Blk XVI\Wangapeka SD\113.1096Ha
	Section 48 Blk XVI\Wangapeka SD\159.8508Ha
	Section 50 Blk XVI\Wangapeka SD\80.9371Ha
	Pt Section 86\SO 10466\7.9389Ha
	Pt Section 60\SO 10466\10.4072Ha
	Lot 2\DP 8304\8.7513Ha
	Section 61 Blk XVI\Wangapeka SD\63.4635Ha
	Section 39 Blk XVI\Wangapeka SD\67.9872Ha
	Section 57 Blk XVI\Wangapeka SD\37.3822Ha
	Section 58 Blk XVI\Wangapeka SD\39.4844Ha
	Lot 1\DP 16062\56.4920Ha
	Section 63 Blk XVI\Wangapeka SD\41.4146Ha
	Section 38 Blk XVI\Wangapeka SD\51.7998Ha
	Lot 1\DP 13330\78.2060Ha
	Lot 2\DP 16062\48.7020Ha
Lot 1\DP 19523\103.6932Ha	
Howard	Pt Section 36\SO 7412\93.6695Ha
	Lot 1\DP 14681\125.7000Ha
	Section 9 Blk X\Howard SD\299.4674Ha
	Section 16 Blk XIV\Howard SD\14.9733Ha
	Section 14 Blk XIV\Howard SD\14.1640Ha
	Section 12 Blk XIV\Howard SD\196.6772Ha
	Section 13 Blk XIV\Howard SD\208.5775Ha
Kingsland	Pt Section 3\SQ 1\1.8484~Ha
	Pt Section 3\SQ 1\1.8484~Ha
	Pt Section 31\SQ 1\21.3644~Ha
	Pt Section 31\SQ 1\2.7138~Ha
	Pt Section 31\SQ 1\21.3644~Ha
	Pt Section 83\SQ 1\35.8210~Ha
	Pt Section 31\SQ 1\2.7138~Ha
	Section 4 Blk VII\Waimea SD\1.1634Ha
	Lot 1\DP 350\52.4325Ha
	Pt Section 3\SQ 1\6.0327~Ha
	Pt Section 3\SQ 1\5.3935~Ha
	Pt Section 32\SQ 1\6.9880~Ha

*Continued on next page...*

...continued

Rabbit Island	Pt Island No 5 Rabbit Waimea East District\131.4274~Ha
	Pt Island No 5 Rabbit Waimea East District\174.1889~Ha
	Section 1 Section Island No 5 Rabbit Waimea East District\49.9787Ha
	Pt Island No 5 Rabbit Waimea East District\263.3250~Ha
	Pt Island No 5 Rabbit Waimea East District\12.7034~Ha
	Pt Island No 5 Rabbit Waimea East District\3.4839~Ha
	Pt Island No 5 Rabbit Waimea East District\494.9416~Ha
	Section 1 Section Island No 3 Rough Waimea East District\56.4663Ha
	Island No 3 Rough Waimea East District\89.3473~Ha
Sherry River	Pt Lot 2A\DP 1951\67.0158Ha
	Pt Section 141\SQ 5\11.0245~Ha
	Pt Section 99\SQ 5\1.0170~Ha
	Pt Section 9 Blk III\Tadmor SD\22.5680~Ha
	Pt Section 121 Blk III\Tadmor SD\9.4245~Ha
	Section 3 Blk III\Tadmor SD\25.7527~Ha
	Pt Section 19 Blk III\Tadmor SD\13.8099~Ha
	Pt Section 4 Blk III\Tadmor SD\4.6016~Ha
	Pt Section 140\SQ 5\8088~m2
	Section 5 Blk III\Tadmor SD\7.1832Ha
	Section 14 Blk III\Tadmor SD\30.0479Ha
	Section 11 Blk III\Tadmor SD\40.7721Ha
	Pt Section 20 Blk III\Tadmor SD\12.5086Ha
	Section 10 Blk III\Tadmor SD\20.0319Ha
	Section 3 Blk II\Tadmor SD\131.9275Ha
	Pt Section 17 Blk III\Tadmor SD\17.3622~Ha
	Section 46 Blk III\Tadmor SD\8.4916~Ha
	Section 17 Blk II\Tadmor SD\2.5220Ha
	Section 18 Blk II\Tadmor SD\58.6100Ha
Section 19 Blk II\Tadmor SD\5930m2	
Section 20 Blk II\Tadmor SD\8250m2	
Section 134 Blk III\Tadmor SD\5.6098Ha	
Tunnickliff	Pt Section 37\Wai-Iti Hills DIST\61.0467~Ha
	Pt Section 33\Wai-Iti Hills DIST\68.6812~Ha

### Appendix 4: Forest Neighbours

Forest	Neighbour	Location	Map ref
Borlase			0
			1
			2
			3
			4
			5
			6
			7
			8
			9
			10
			11
			12
			13
			14
			15
			16
			17
			18
			19
			20
			21
			22
			23
			24
		25	
Howard			0
			1
			2
			3
			4
			5
			6
			7
			8
			9
		10	

*Continued on next page...*

...continued

Howard			11
			12
			13
			14
			15
			16
			17
			18
			19
			20
			21
			22
			23
			24
Kingsland			0
			1
			2
			3
			4
			5
			6
			7
			8
			9
			10
			11
			12
			13
			14
			15
			16
			17
			18
			19

*Continued on next page...*

*...continued*

Sherry River			0
			1
			2
			3
			4
			5
			6
			7
			8
			9
			10
			11
			12
			13
			14
			15
			16
			17
			18
			19
			20
			21
			22
			23
		24	
Tunnickliff			0
			1
			2
			3
			4
			5
			6
			7
			8
			9
			10

*Continued on next page...*

*...continued*

Tunnicliff			11
			12
			13
			14
			15
			16
			17
			18
			19
			20

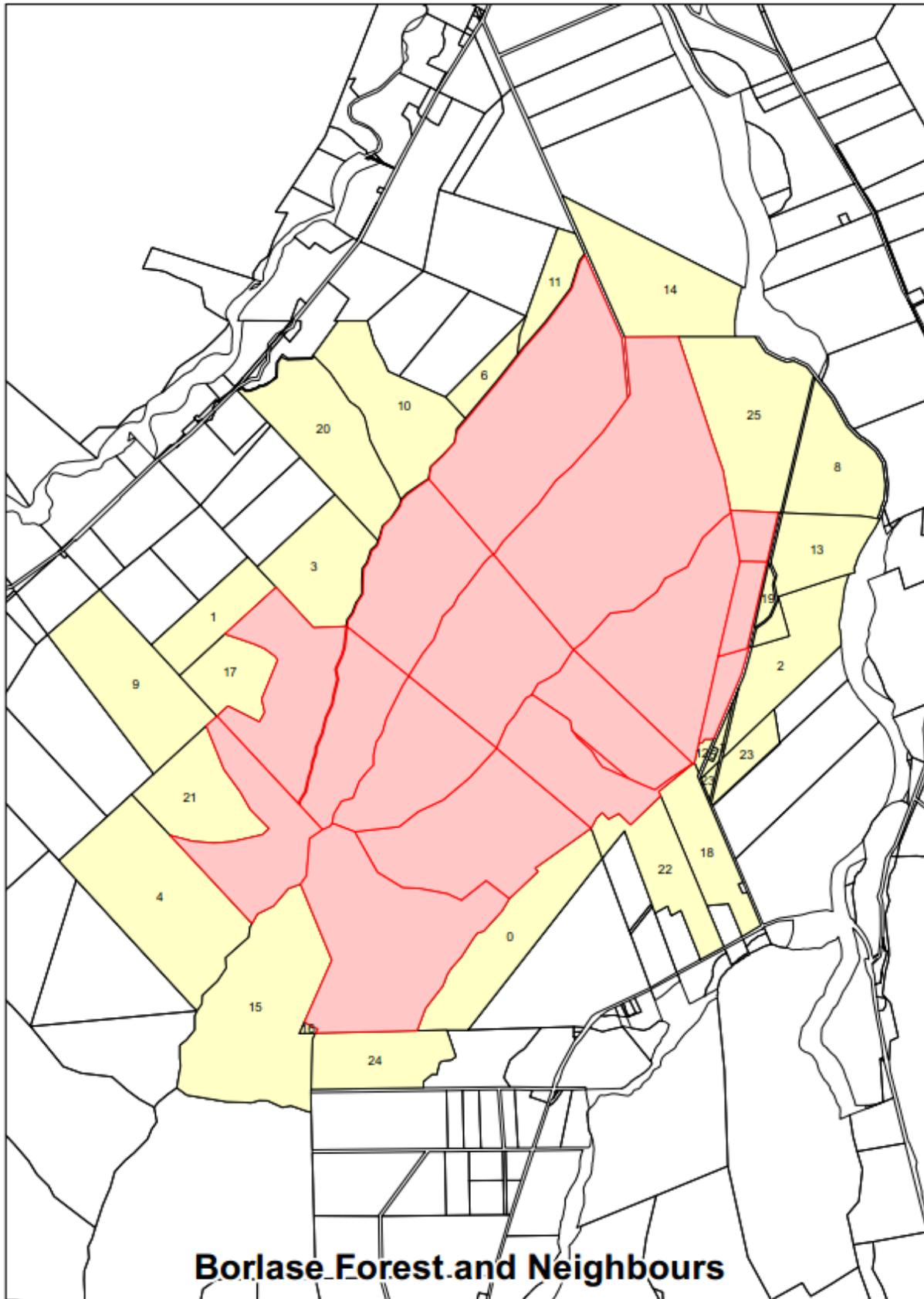
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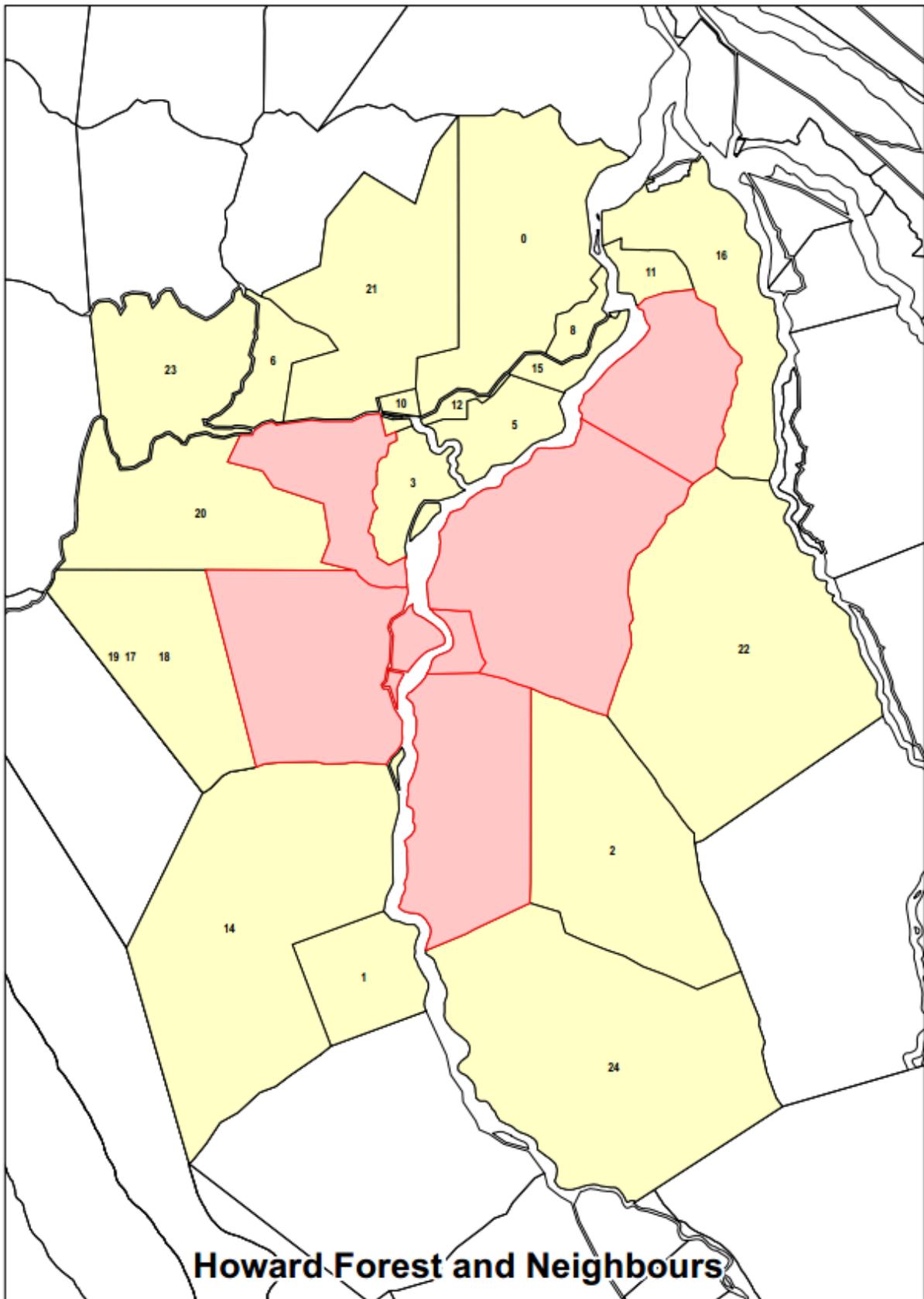
## **Appendix 5: Forest Neighbour Location Maps**

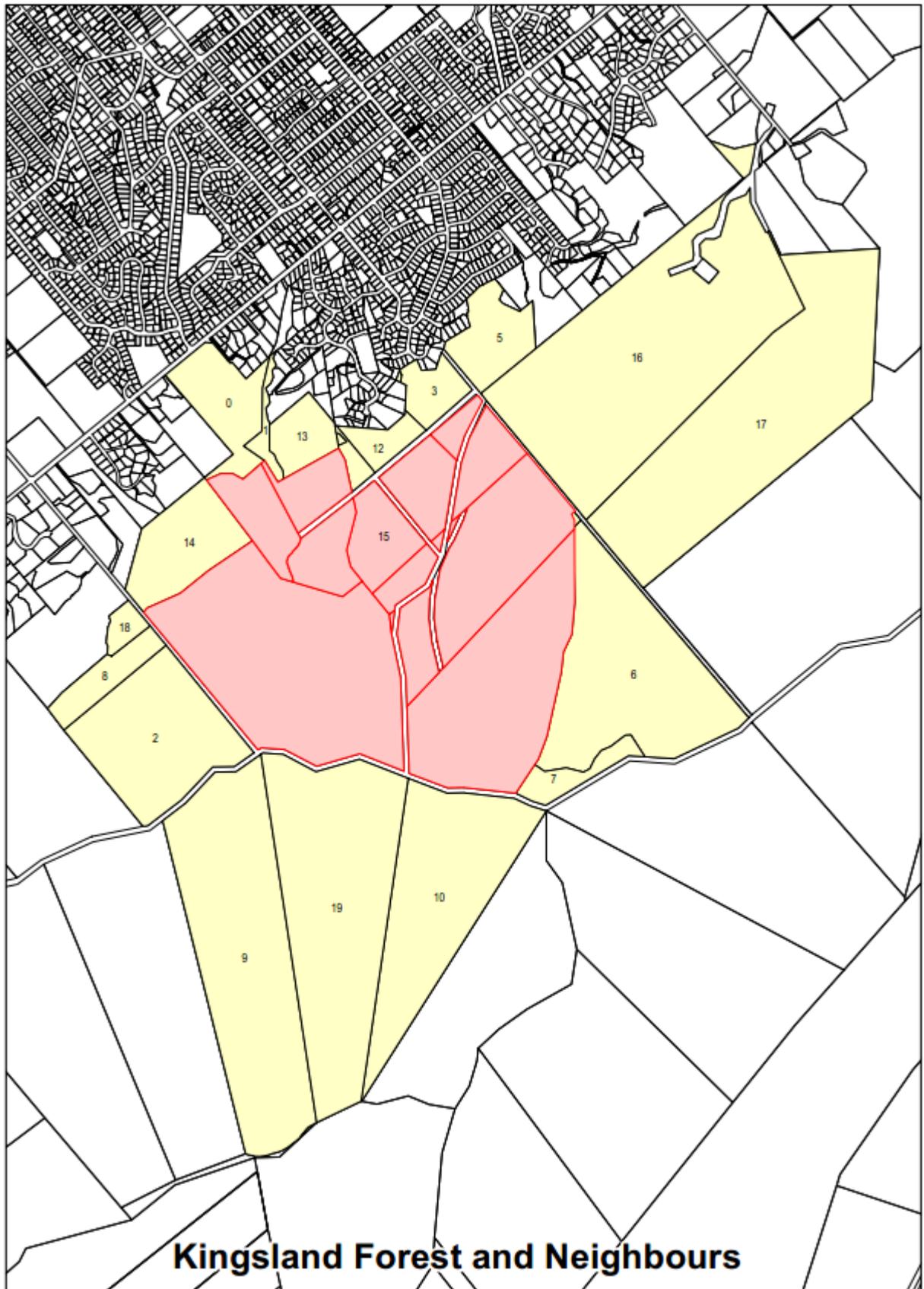
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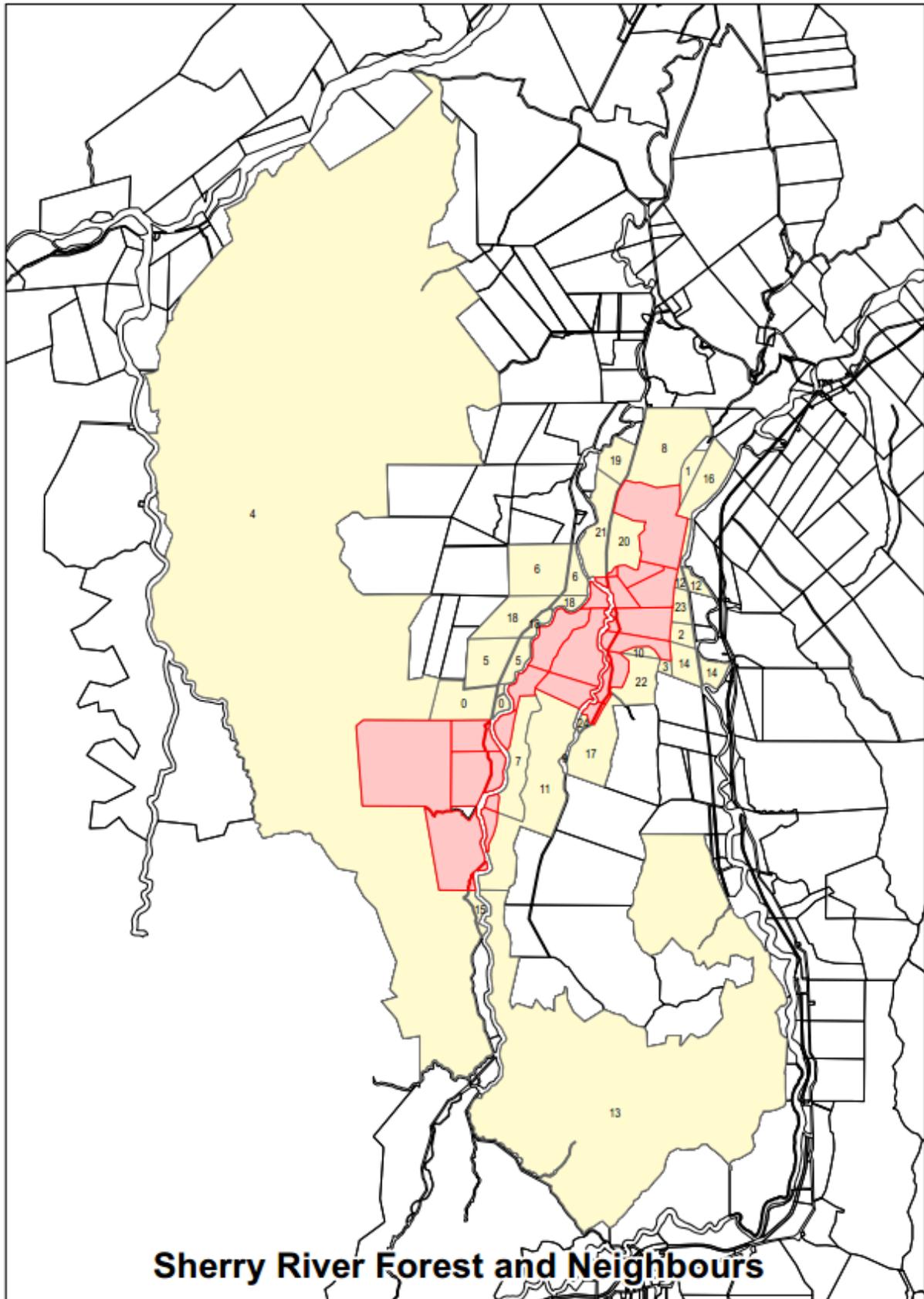
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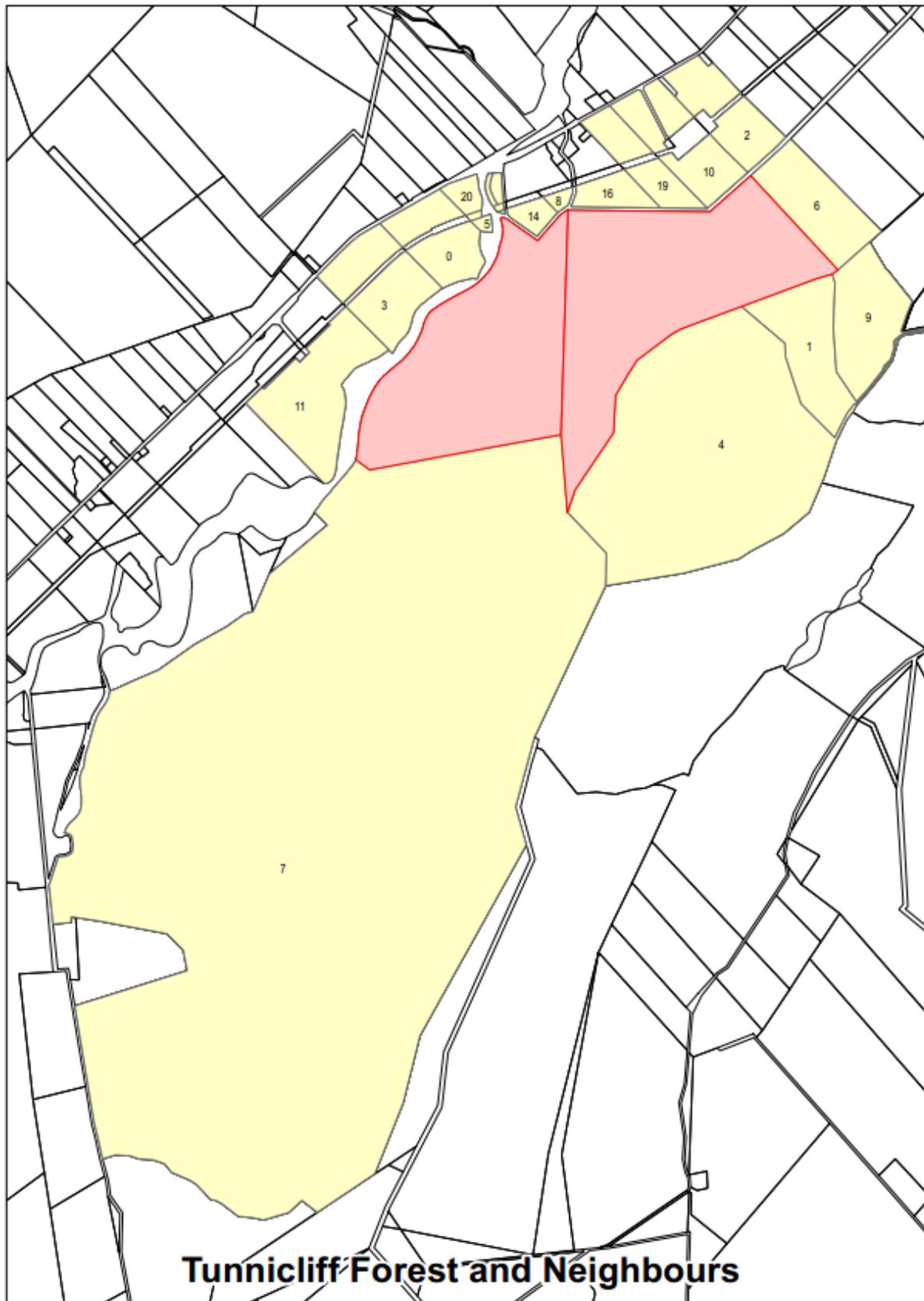
NB: Numbers on map refer to the 'Map ref' in the previous appendix







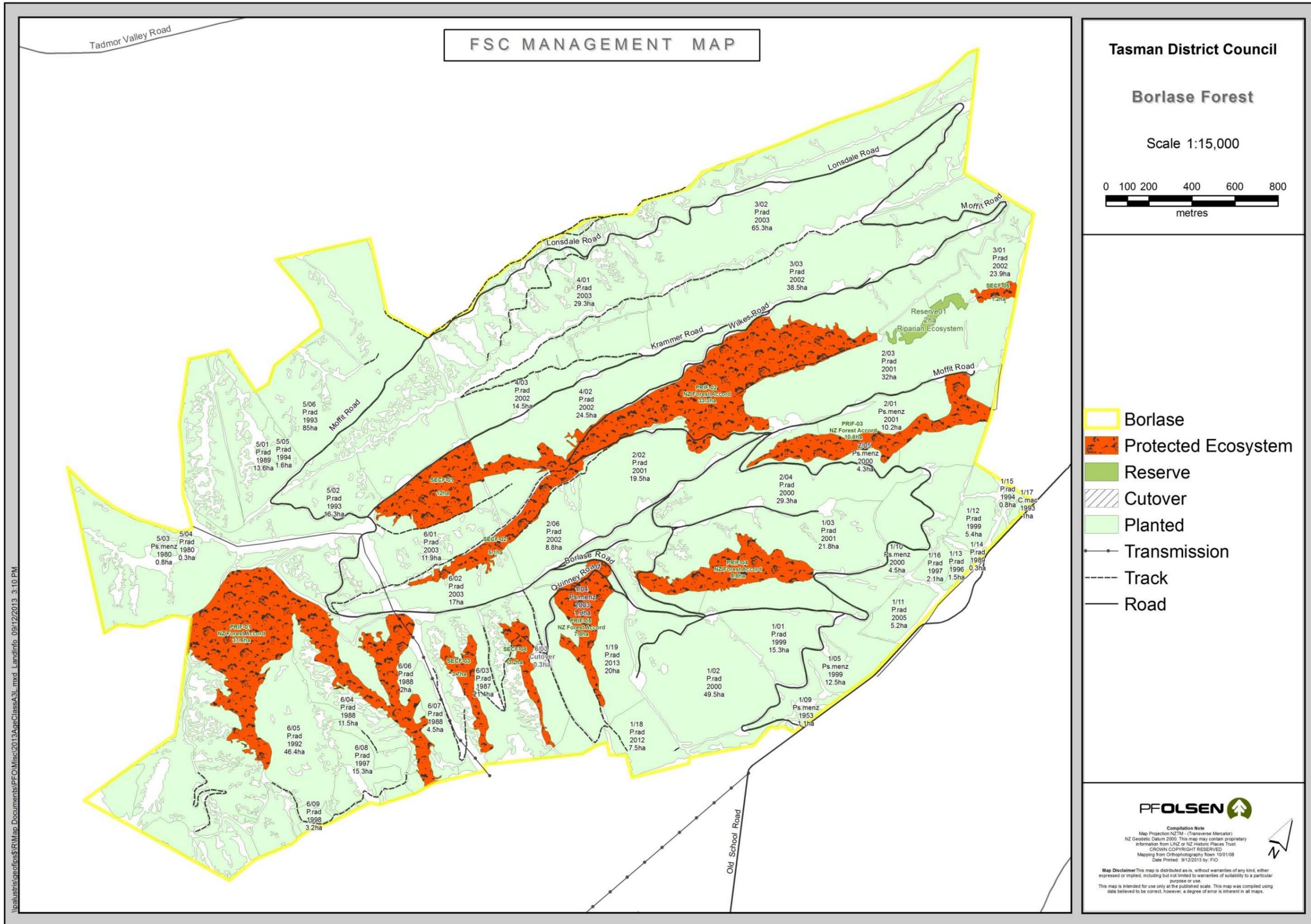




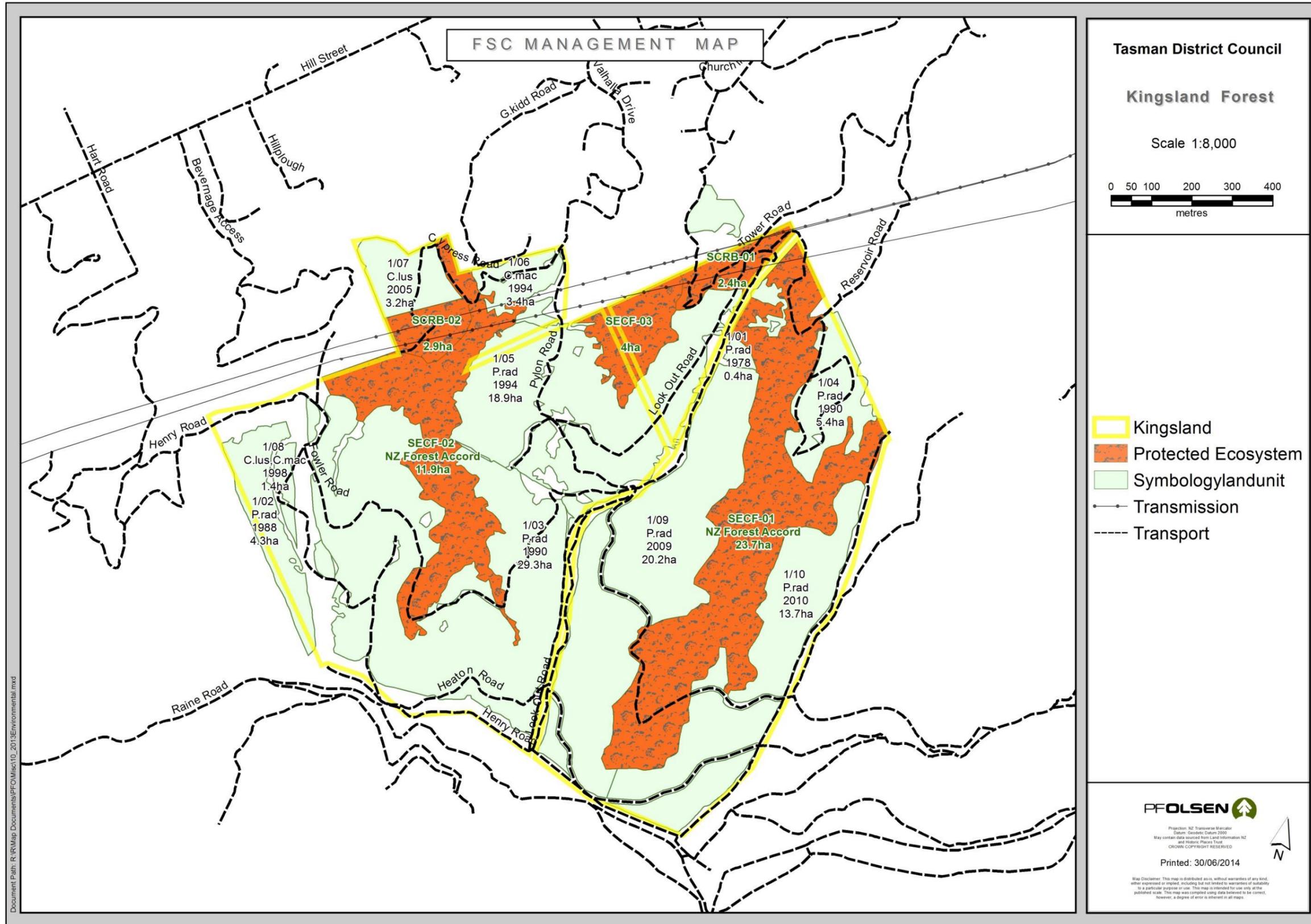
## **Appendix 6: Forest Stand Maps**

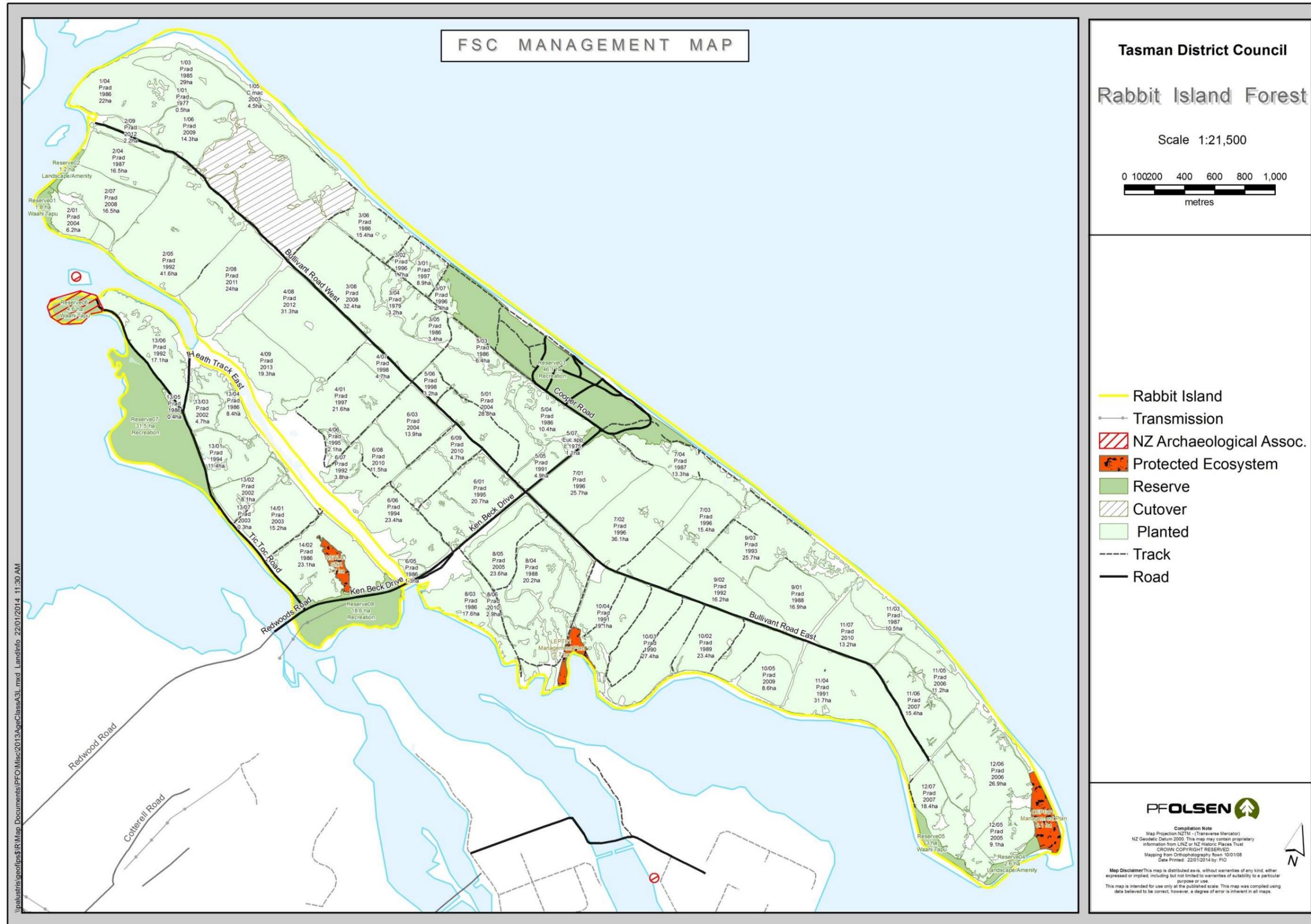
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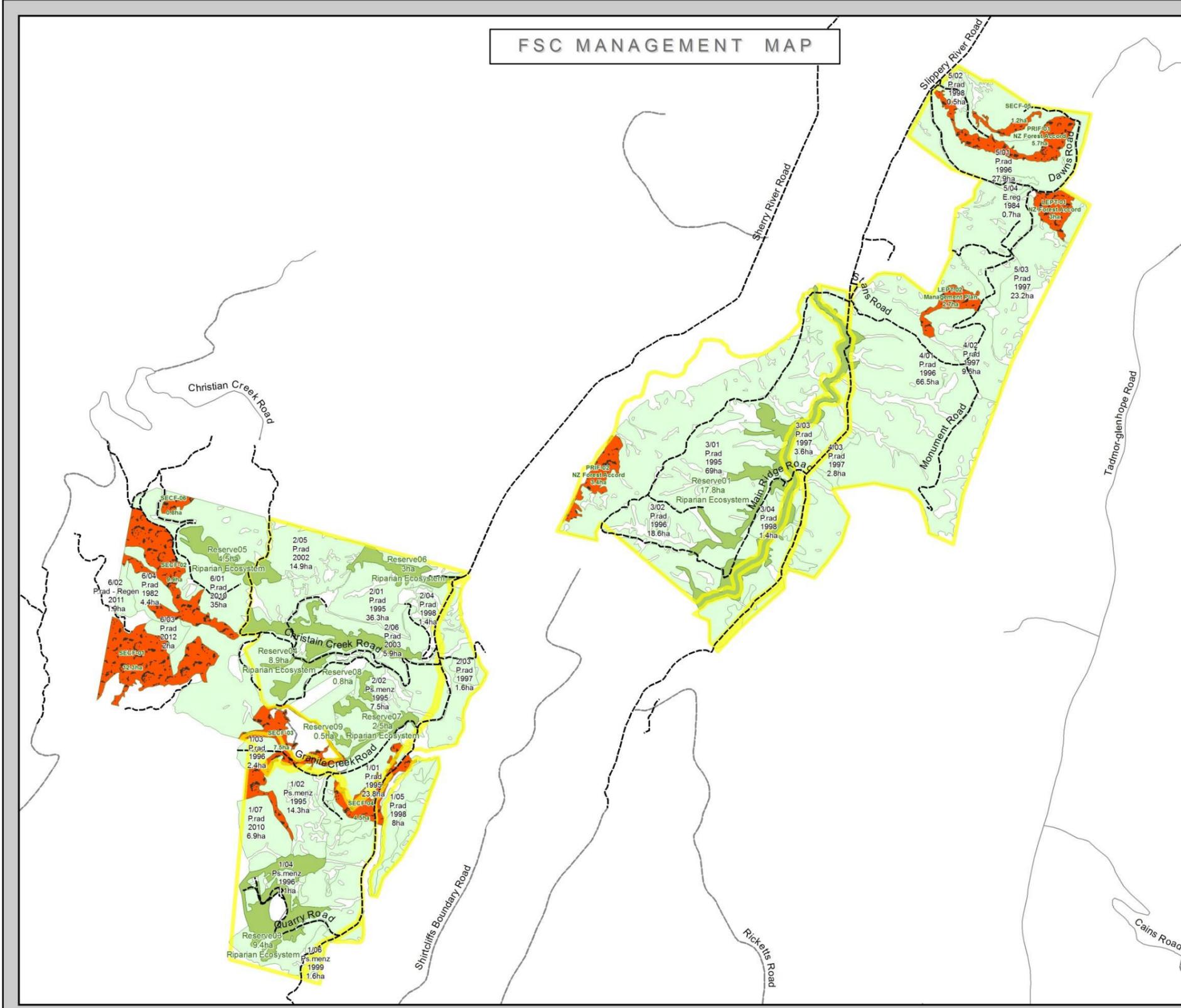








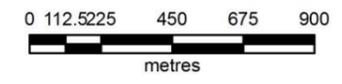
FSC MANAGEMENT MAP



Tasman District Council

Sherry River Forest

Scale 1:18,000

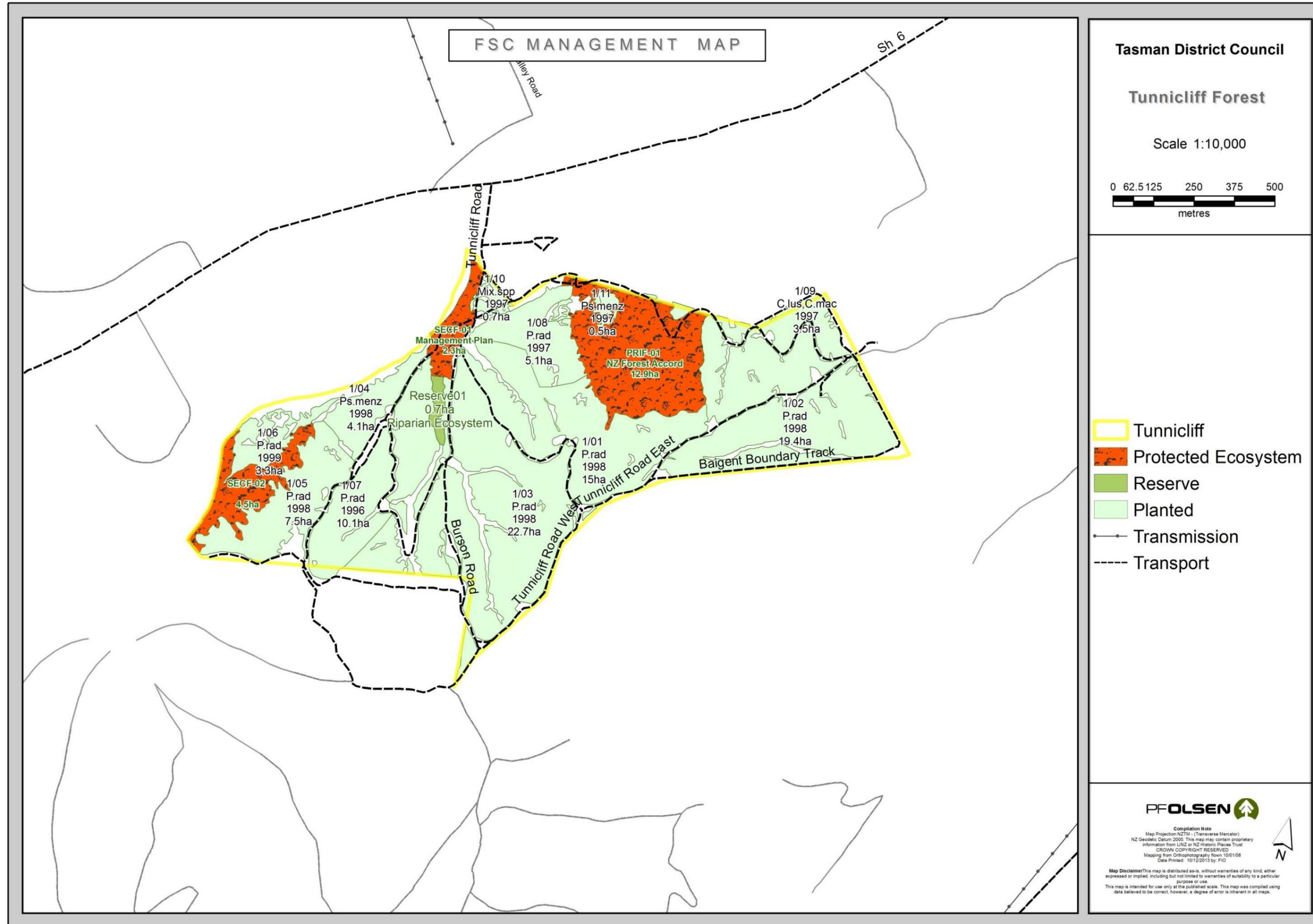


-  Sherry River
-  Protected Ecosystem
-  Reserve
-  Planted
-  Transport

**Compilation Note**  
Map Projection: NZTM - (Transverse Mercator)  
NZ Geodetic Datum 2000. This map may contain proprietary information from LINZ or NZ Historic Places Trust. CROWN COPYRIGHT RESERVED.  
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**Tasman District Council**

**Tunnickliff Forest**

Scale 1:10,000

0 62.5 125 250 375 500  
metres

-  Tunnickliff
-  Protected Ecosystem
-  Reserve
-  Planted
-  Transmission
-  Transport

**PFOLSEN** 

Compilation Note  
Map Projection: NZTM (Transverse Mercator)  
NZ Geodetic Datum 2000. This map may contain proprietary information from LINZ or NZ Historic Places Trust  
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Date Printed: 10/12/2013 by: PJO

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This map is intended for use only at the published scale. This map was compiled using data believed to be correct, however, a degree of error is inherent in all maps.

## Appendix 7: Treestocks and Seedlots

Forest	Stand	Area (ha)	Species	Year	Rotation	Seedlot	GF	Type
Borlase	BORL-0001-01	15.3	P.rad					
	BORL-0001-02	49.5	P.rad					
	BORL-0001-03	21.8	P.rad					
	BORL-0001-04	1.9	Ps.menz					
	BORL-0001-05	12.5	Ps.menz					
	BORL-0001-10	4.5	Ps.menz					
	BORL-0001-11	5.2	P.rad					
	BORL-0001-18	7.5	P.rad					
	BORL-0002-01	10.2	Ps.menz					
	BORL-0002-02	19.5	P.rad					
	BORL-0002-03	32	P.rad					
	BORL-0002-03	32	P.rad					
	BORL-0002-03	32	P.rad					
	BORL-0002-03	32	P.rad					
	BORL-0002-04	29.3	P.rad					
	BORL-0002-05	4.3	Ps.menz					
	BORL-0002-06	8.8	P.rad					
	BORL-0002-06	8.8	P.rad					
	BORL-0003-01	23.9	P.rad					
	BORL-0003-01	23.9	P.rad					
	BORL-0003-01	23.9	P.rad					
	BORL-0003-02	65.3	P.rad					
	BORL-0003-02	65.3	P.rad					
	BORL-0003-03	38.5	P.rad					
	BORL-0004-01	29.3	P.rad					
	BORL-0004-01	29.3	P.rad					
	BORL-0004-02	24.5	P.rad					
	BORL-0004-03	14.5	P.rad					
	BORL-0005-05	1.6	P.rad					
	BORL-0005-06	85	P.rad					
	BORL-0006-01	11.9	P.rad					
	BORL-0006-01	11.9	P.rad					
	BORL-0006-02	17	P.rad					
BORL-0006-08	15.3	P.rad						
BORL-0006-09	3.2	P.rad						
Howard River	HOWD-0001-01	70.4	P.rad					
	HOWD-0001-01	70.4	P.rad					
	HOWD-0001-01	70.4	P.rad					
	HOWD-0001-01	70.4	P.rad					
	HOWD-0001-02	6	Ps.menz					
HOWD-0001-03	8.5	P.rad						

	HOWD-0001-04	0.9	P.rad					
	HOWD-0002-01	3.4	P.rad					
	HOWD-0002-01	3.4	P.rad					
	HOWD-0002-03	3	Ps.menz					
	HOWD-0002-04	15.7	P.rad					
	HOWD-0002-05	7.8	Ps.menz					
	HOWD-0002-06	11.6	C.mac					
	HOWD-0002-07	1.7	Lar.spp					
	HOWD-0002-08	5.8	Ps.menz					
	HOWD-0002-09	0.1	P.rad					
	HOWD-0002-10	0.5	P.rad					
	HOWD-0002-11	3.4	P.rad					
	HOWD-0003-01	86.4	Ps.menz					
	HOWD-0004-01	33.5	P.rad					
	HOWD-0004-01	33.5	P.rad					
	HOWD-0004-02	27.5	Ps.menz					
	HOWD-0004-03	0.5	Ps.menz					
	HOWD-0004-04	2.8	P.rad					
	HOWD-0006-01	74.2	P.rad					
	HOWD-0006-01	74.2	P.rad					
	HOWD-0006-02	8.7	Ps.menz					
	HOWD-0007-01	54.6	P.rad					
	HOWD-0007-01	54.6	P.rad					
	HOWD-0007-02	1	Ps.menz					
	HOWD-0007-03	2.2	P.rad					
Kingsland	KING-0001-05	18.9	P.rad					
	KING-0001-07	3.2	C.lus					
	KING-0001-08	1.4	C.lus					
	KING-0001-09	20.2	P.rad					
	KING-0001-10	13.7	P.rad					
Rabbit Island	RABB-0001-01	0.5	P.rad					
	RABB-0001-05	4.5	C.mac					
	RABB-0001-06	15.6	P.rad					
	RABB-0002-01	6.2	P.rad					
	RABB-0002-01	6.2	P.rad					
	RABB-0002-04	16.5	P.rad					
	RABB-0002-05	41.6	P.rad					
	RABB-0002-05	41.6	P.rad					
	RABB-0002-07	16.1	P.rad					
	RABB-0002-08	24	P.rad					
	RABB-0002-09	2.2	P.rad					
	RABB-0003-01	8.9	P.rad					
	RABB-0003-01	8.9	P.rad					
	RABB-0003-02	1.7	P.rad					
	RABB-0003-07	2.4	P.rad					
RABB-0003-08	32.5	P.rad						

	RABB-0003-08	32.5	P.rad					
	RABB-0004-01	21.6	P.rad					
	RABB-0004-06	2.1	P.rad					
	RABB-0004-07	4.7	P.rad					
	RABB-0004-08	31.3	P.rad					
	RABB-0005-01	28.8	P.rad					
	RABB-0005-06	3.2	P.rad					
	RABB-0006-01	20.7	P.rad					
	RABB-0006-03	13.9	P.rad					
	RABB-0006-06	23.4	P.rad					
	RABB-0006-06	23.4	P.rad					
	RABB-0006-08	11.5	P.rad					
	RABB-0006-09	4.7	P.rad					
	RABB-0007-01	25.7	P.rad					
	RABB-0007-01	25.7	P.rad					
	RABB-0007-01	25.7	P.rad					
	RABB-0007-02	36.1	P.rad					
	RABB-0007-02	36.1	P.rad					
	RABB-0007-03	15.4	P.rad					
	RABB-0008-05	23.6	P.rad					
	RABB-0008-05	23.6	P.rad					
	RABB-0008-06	3.1	P.rad					
	RABB-0010-05	8.6	P.rad					
	RABB-0011-05	11.2	P.rad					
	RABB-0011-06	15.4	P.rad					
	RABB-0011-07	13.2	P.rad					
	RABB-0012-05	9.1	P.rad					
	RABB-0012-06	26.9	P.rad					
	RABB-0012-07	18.4	P.rad					
	RABB-0013-01	11.4	P.rad					
	RABB-0013-02	8.1	P.rad					
	RABB-0013-02	8.1	P.rad					
	RABB-0013-03	4.7	P.rad					
	RABB-0014-01	15.2	P.rad					
Sherry River	SHER-0001-01	23.8	P.rad					
	SHER-0001-01	23.8	P.rad					
	SHER-0001-01	23.8	P.rad					
	SHER-0001-01	23.8	P.rad					
	SHER-0001-02	14.3	Ps.menz					
	SHER-0001-03	2.4	P.rad					
	SHER-0001-04	1.1	Ps.menz					
	SHER-0001-05	8	P.rad					
	SHER-0001-06	1.6	Ps.menz					
	SHER-0001-07	6.9	P.rad					
	SHER-0002-01	36.3	P.rad					
	SHER-0002-01	36.3	P.rad					

	SHER-0002-01	36.3	P.rad					
	SHER-0002-02	7.5	Ps.menz					
	SHER-0002-03	1.6	P.rad					
	SHER-0002-04	1.4	P.rad					
	SHER-0002-05	14.9	P.rad					
	SHER-0002-06	5.9	P.rad					
	SHER-0003-01	69	P.rad					
	SHER-0003-01	69	P.rad					
	SHER-0003-01	69	P.rad					
	SHER-0003-02	18.6	P.rad					
	SHER-0003-02	18.6	P.rad					
	SHER-0003-03	3.6	P.rad					
	SHER-0003-04	1.4	P.rad					
	SHER-0004-01	66.5	P.rad					
	SHER-0004-01	66.5	P.rad					
	SHER-0004-02	9.6	P.rad					
	SHER-0004-03	2.8	P.rad					
	SHER-0005-01	27.9	P.rad					
	SHER-0005-01	27.9	P.rad					
	SHER-0005-02	0.5	P.rad					
	SHER-0005-03	23.2	P.rad					
	SHER-0006-01	35	P.rad					
	SHER-0006-01	35	P.rad					
	SHER-0006-03	2	P.rad					
Tunncliff	TUNN-0001-01	15	P.rad					
	TUNN-0001-02	19.4	P.rad					
	TUNN-0001-03	22.7	P.rad					
	TUNN-0001-04	4.1	Ps.menz					
	TUNN-0001-05	7.5	P.rad					
	TUNN-0001-06	3.3	P.rad					
	TUNN-0001-07	10.1	P.rad					
	TUNN-0001-08	5.1	P.rad					
	TUNN-0001-08	5.1	P.rad					
	TUNN-0001-09	3.5	C.lus					
	TUNN-0001-11	0.5	Ps.menz					

## **Appendix 8: High Conservation Value Forests**

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*Next 10 pages*

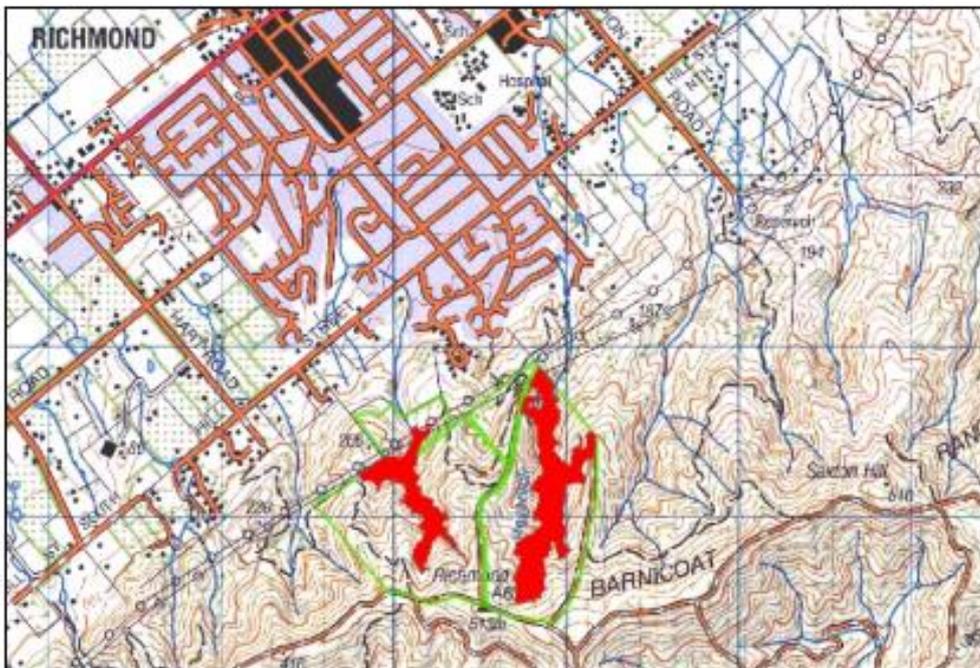
## High Conservation Value Forest Consultation Summary

Friday, 27 December 2013

**Location**

Two areas of native bush within Kingsland Forest, owned by Tasman District Council:

1. Reservoir Creek bush NZTM E1616906, N5421158  
23.7 hectares
  
2. Jimmy Lee Creek bush NZTM E1616135, N5421085  
11.9 hectares



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**Proposed HCV class**

The proposed Class is HCV 1 – ‘Forest areas containing globally, regionally or nationally significant concentrations of biodiversity values’.

---

**Site values**

Under FSC Principles and Criteria Principle 6, the following two areas of indigenous forest have been identified as candidates for classification as High Conservation Value Forests.

Kingsland forest is located in the Bryant Ecological District, where once widespread indigenous vegetation is now restricted to the hills in the east and south. Mixed beech-podocarp forests are at higher altitudes, moving into manuka dominated scrub down the altitudinal gradient. Whilst areas of the district remain in tall forest and scrub, much has been replaced by sheep and beef farming and exotic plantation forest.

Both Reservoir Creek and Jimmy Lee Creek are rare, representative examples of lowland podocarp-hardwood ecosystems. Lowland forest types have been significantly reduced by historical land clearance and degradation, with smaller fragments of forest now all that is remaining of a once widespread vegetation assemblage, particularly below 300 metres elevation.

The areas include titoki rich gully forest with emergent podocarps, a type which less than 5% remains of the original pre-human forest extent. There are several individual podocarps notable for their unusually large stature within Reservoir Creek (including totara and kahikatea with diameters approximately 1.8 metres) and Jimmy Lee Creek (matai diameter 1.4 metres).

Both Reservoir Creek and Jimmy Lee Creek are connected to other areas of indigenous vegetation, showcase a significant altitudinal gradient, and are well buffered by scrub and other native forest.

Several plant species of significance have been identified, including jointed fern (rare in the Bryant ED) and lance fern (scarce in the Bryant ED).

---

**Site description**

The sites have been described and assessed by Michael North, in reports commissioned by the Tasman District Council in 2008<sup>i</sup> (Reservoir Creek) and 2012<sup>ii</sup> (Jimmy Lee Creek).

**Reservoir Creek**

The 23.7 hectare site is one of several northwest facing gullies in the Bryant Range, above the Richmond township. The bush runs from 120 to 460 metres above sea level, and subsequently displays a range of vegetation types. The gully floor is relatively undisturbed broadleaved-podocarp, transitioning into secondary broadleaved forest and scrub/shrubland.

Predominant vegetation types are:

1. **Titoki-mahoe-pigeonwood gully forest, +- tawa**  
Rare emergent totara, matai, kahikatea and miro. Low density understorey beneath a dense canopy. Lush fern groundcover, nikau in the gully, kiekie in localised areas and on the trunks of the larger podocarps.
2. **Mahoe-pigeonwood gully forest**  
Along the upper edge of type 1, the top edge of the gully. Occasional kaikomako, small patch of tawa, more open understorey and groundcover.
3. **Mahoe gully forest**  
Basic mahoe dominated forest, sparse vegetation beneath the canopy attributed to ungulate browse.
4. **Titoki-mahoe side slope forest**  
Occasional pigeonwood, sparse understorey, fern dominated groundcover. Unclear whether this is primary or mature secondary forest.
5. **Mahoe-mixed broadleaved side slope forest**  
Pigeonwood, lemonwood, hinau, kaikomako, heketara, broadleaf. Localised areas of pole matai regeneration. Coprosma shows signs of significant browse but subsequent recovery. Thick fern groundcover.
6. **Lemonwood side slope/gully head forest**  
Top end of the bush. Lemonwood dominated, mahoe and pole matai regeneration in places. Little understorey due to ungulate browse.



*Upper extent of Reservoir Creek bush*



*Creek side vegetation*

### Jimmy Lee Creek

The 11.9 hectare site is another of several northwest facing gullies in the Bryant Range, above the Richmond township. The bush runs from 120 to 360 metres above sea level, and is steep and incised in the upper reaches. The gully floor is relatively undisturbed broadleaved-podocarp, transitioning into secondary broadleaved forest and scrub/shrubland, similar to Reservoir Creek.

Predominant vegetation types are:

1. **Titoki-mahoe-tawa-matai gully forest**  
Pigeonwood in places, occasional lemonwood and kanuka. Kawakawa understorey dominant, where this is lacking mahoe and titoki regeneration is coming through. Climbing ferns and groundcover ferns abundant.
2. **Titoki- mahoe-pigeonwood-matai gully side slope forest**  
Along the upper edge of type 1, the top edge of the gully. Lacks the tawa component. Matai tends to be smaller in canopy, and absent in places. Mid slopes lack understorey broadleaved regeneration, a sign of ungulate browse.
3. **Matai forest on spur crest**  
Small tightly-stocked pole stand of matai.
4. **Mahoe scrub/low side slope forest**  
Occasional kanuka, understorey variable in density but includes mapou, mahoe, pigeonwood.
5. **Kanuka side slope forest**  
Bands of kanuka forest at various stages of succession. Mahoe, matai, fivefinger, pigeonwood in varying canopy proportions. Groundcover ferns dense when kanuka canopy is light.
6. **Mixed broadleaved side slope forest, +- kanuka**  
Top end of the bush. Diverse secondary forest including mahoe, lemonwood, matai, kanuka, pigeonwood, kaikomako.



*Close proximity to suburban Richmond*



*Lush valley floor complex forest*

**Proposed management**

The Richmond Hills Conservation Group is a community based group that carries out pest trapping, weed control and native fauna observation throughout the indigenous forest areas on the Richmond hills, which includes both Reservoir Creek and Jimmy Lee Creek. Complementary and cooperative ecological management alongside these groups is imperative.

The primary risks to the maintenance or enhancement of this site are external site modifications and pest weed invasion and pest animal browse. Thus proposed management is:



Element	Action
<b>Weed management</b>	Highest priority. Remove banana passionfruit vine. Control old mans beard spread into new areas. Remove occasional hawthorn, barberry, and gorse. Poison/ringbark wilding pines and macrocarpa (lower end Reservoir Creek).
<b>Site disturbance</b>	Full directional felling control and pull back from all established native vegetation boundaries. No trees to be dragged through areas if directional control lost- either shovel from existing track or cut up to promote rapid breakdown.  At replanting, identify areas that should not be replanted, e.g. difficult to harvest, promotion of native linkages. Encourage natural regeneration, control vine weeds.
<b>Aerial herbicide spraying in plantations</b>	Sensitive boundary protocols apply. Increased buffers, wind direction monitoring at boundary.
<b>Monitoring</b>	Photopoint only, unless adverse trends become visible. Annual ground checks for vine weeds and ungulates until control established. Monitor conservation group trap catch results.
<b>Pest control</b>	Encourage and support local Conservation Group's trapping efforts. Monitor forest for ungulate sign.
<b>Weka management</b>	Consult with local Department of Conservation staff regarding specific weka management. Support Conservation Group's trapping efforts. Ensure any review of the Dog Control Bylaw includes consideration of special management for weka.

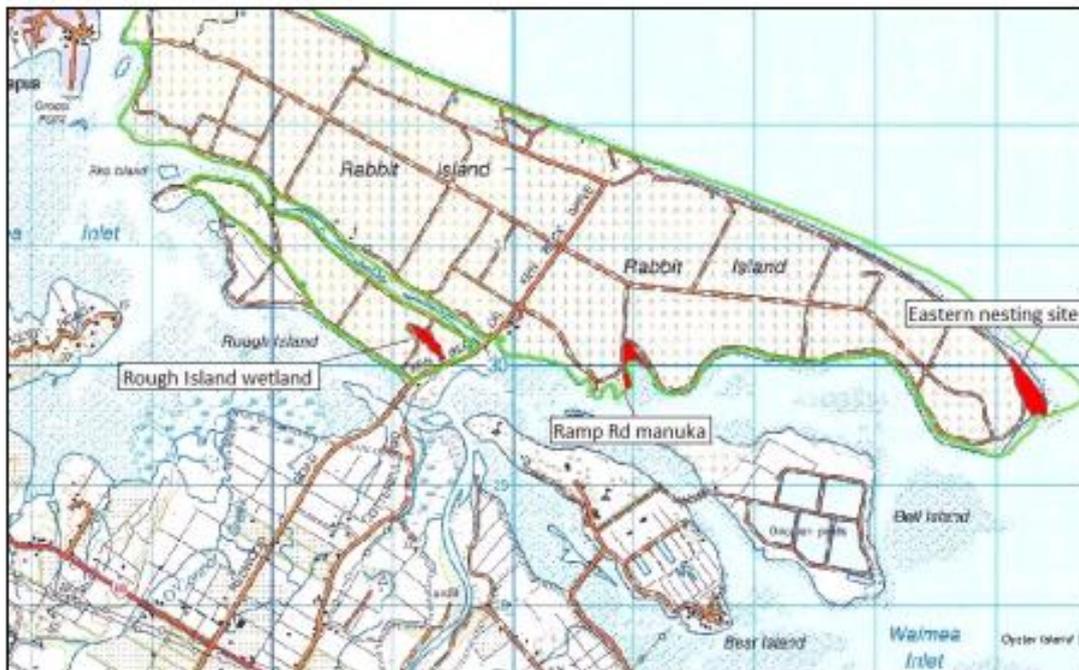
## High Conservation Value Forest Consultation Summary

Friday, 27 December 2013

**Location**

Three areas of native vegetation within Rabbit Island Forest, owned by Tasman District Council:

1. Rough Island wetland NZTM E1611277, N5430226  
2.7 hectares
  
2. Ramp Road manuka NZTM E1612945, N5430107  
2.7 hectares
  
3. Eastern nesting site NZTM E1616261, N5429801  
6.1 hectares



**Proposed HCV class**

The proposed Class is HCV 3 – ‘Forest areas that are in or contain rare, threatened or endangered ecosystems’.

**Site values**

Under FSC Principles and Criteria Principle 6, the following three areas have been identified as candidates for classification as High Conservation Value Forests.

Rabbit Island forest is located in the Motueka Ecological District (ED). Originally most of the district was forested with podocarp/hardwood/beechn and smaller areas of raupo/flax wetlands. Polynesian and European arrival saw much of the forest cleared and wetlands drained.

Extensive estuaries in the ED provide habitat for more than 50 species of estuarine birds, including Arctic breeding migrants and banded rail and marsh crake. The common landuse types today in the district (dairy farming, sheep and beef, horticulture) offers little habitat for other native species.

The three areas identified on Rabbit Island are three distinct types of vegetation with different ecological values. All three are significant owing to the depletion of intact native ecosystems within the district, estimated at less than 1% of the original pre-human extent.

Rough Island wetland is significant as 99.8% of wetlands within the Motueka ED have been lost. This wetland retains a high level of naturalness and functionality and is of significant size, unlike many wetland remnants in the area. It is the largest wetland, and only remaining fen, within the ED. It also boasts the only recorded South Island population of *Baumea articulata* and *Carex fascicularis*.

The Ramp Road manuka area is an estuarine ecosystem on a small peninsula adjacent to the planted forest. Estuaries are an originally rare ecosystem, and estuarine scrub is significantly depleted in the Motueka ED. The site displays well developed ecotonal vegetation assemblages, from the often inundated tidal areas to damp saltmarsh to dryland manuka scrubland. This may be the only representative example of this ecotonal sequence in the ED.

The eastern nesting site is one of 11 sites in the Tasman area deemed internationally important for the habitat it provides for endemic and migrant shorebirds (oystercatchers, stilts, plovers and sandpipers), for both roosting and nesting<sup>i</sup>.

**Site description**

The Rough Island wetland<sup>ii</sup> and Ramp Road manuka<sup>iii</sup> sites have been described and assessed by Michael North, in reports commissioned by the Tasman District Council in 2008.

**Rough Island wetland**

The 2.7 hectare site exists on low fertility beach deposits near sea level, but is freshwater dominated and maintained by groundwater and rainwater, rather than stream-fed. It is wet all year round, with visible surface water during wet periods, and is likely situated in an old sea channel.

Predominant vegetation types are:

**1. Cabbage tree-manuka low forest/tall scrub**

In dense canopy areas, understorey restricted to sparse *Carex virgata*, *Coprosma propinqua*, scattered *C. propinqua x robusta*. Lower density canopy areas have gorse/blackberry understorey. One karamu and one male swamp coprosma present.

**2. Mixed exotic sedge/grass/herbfield**

Oval sedge, creeping bent, creeping buttercup, lesser spearwort, jointed rush. Native species in localised patches throughout (*Juncus australis*, *C. virgata*, *C. fascicularis*, *Baumea articulata*).



View across the forest/scrub component



Herbfield inundated after a wet winter

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**Ramp Road manuka**

The 2.7 hectare site is a flat estuarine site just above and below mean high tide mark on the southern margin of Rabbit Island. The site is exemplary of estuarine succession, exhibiting distinct vegetation changes across the gradient from mean high water to dryland manuka scrub.

Predominant vegetation types are:

1. **Manuka tall scrub**  
Under dense manuka canopy, understorey is sparse, other areas understorey comprises tall fescue, knobby clubrush, pohuehue, mingimingi. Some manuka dieback, reverting to rush/grass/sedgeland.
2. **Saltmarsh ribbonwood**  
Along the edge of type 1. Dense simple scrub, or in association with tall sea rush, tall fescue, knobby clubrush.
3. **Mixed associations**  
Variable compositions of sea rush, tall fescue, knobby clubrush, low manuka, gorse, saltmarsh ribbonwood.
4. **Estuary tussock**  
Around type 2. Occasional sea rush, glasswort and sea primrose.
5. **Low herbfield**  
Pockets of *Selliera radicans*, sea celery, buckshorn plantain, sea primrose scattered through open saltmarsh ribbonwood.



Estuarine vegetation sequence



Pohuehue, sea rush, into saltmarsh ribbonwood

**Eastern nesting site**

This 6.1 hectare site is a flat grassland above the high tide mark on the eastern margin of Rabbit Island. Predominantly exotic grasses, there are isolated pockets of flax and sedges, and small to medium sized wilding pines. Bordered on one side by a road and on the other sides the coast and seabird habitat, it is a distinct unit separate to the exotic plantation. This site is ecologically significant for seabird habitat rather than existing vegetation types.



**Proposed management**

Keep Richmond Beautiful is a community based group that carries out pest trapping on Rabbit Island, particularly for stoat control around seabird nesting sites. Complementary and cooperative ecological management alongside this group is imperative.

The primary risks to the maintenance or enhancement of these sites are invasive weeds (wetland and manuka) and pest animals (nesting site). Thus proposed management is:

Element	Action
<b>Weed pest management</b>	Wetland: Remove blackberry, pines, gorse, crack willow, old man's beard. Manuka: Remove wilding pines, gorse, iceplant, broom, Spanish heath. Nesting site: Remove wilding pines and gorse.
<b>Site disturbance</b>	Full directional felling control and pull back from all established native vegetation boundaries. No trees to be dragged through areas if directional control lost- either shovel from existing track or cut up to promote rapid breakdown. Prevent vehicular access.  At replanting, identify areas that should not be replanted, e.g. difficult to harvest, promotion of native linkages, increase site buffering. Encourage natural regeneration, control weeds.
<b>Aerial herbicide spraying in plantations</b>	Sensitive boundary protocols apply. Increased buffers, wind direction monitoring at boundary.
<b>Monitoring</b>	Photopoint only, unless adverse trends become visible. Annual ground checks for weeds until control established. Monitor conservation group trap catch results.
<b>Pest control</b>	Encourage and support local conservation group's trapping efforts.
<b>Seabird management</b>	Consult with local Department of Conservation staff regarding specific management. Support conservation group's trapping efforts. Maintain dog prohibition on Rabbit Island. Restrict recreation adjacent to seabird nesting sites.

## Appendix 9: Regional Pest Management Strategy Pests

Pest Designation	Common Name	Scientific Name
Total Control Pests	African Feather Grass	<i>Pennisetum macrourum</i>
	Bathurst Bur	<i>Xanthium spinosum</i>
	Boxthorn	<i>Lycium ferocissimum</i>
	Cathedral Bells	<i>Cobaea scandens</i>
	Climbing Spindleberry	<i>Celastrus orbiculatus</i>
	Egeria	<i>Egeria densa</i>
	Entire Marshwort	<i>Nymphoides geminata (R Br) Kuntze</i>
	Hornwort	<i>Ceratophyllum demersum</i>
	Madeira Vine	<i>Anredera cordifolia</i>
	Phragmites	<i>Phragmites australis</i>
	Saffron Thistle	<i>Carthamus lanatus</i>
	Senegal Tea	<i>Gymnocoronis spilanthoides</i>
Spartina	<i>Spartina spp</i>	
Progressive Control Pests	Banana Passion Vine (Golden Bay)	<i>Passiflora mollissima/mixta</i>
	Boneseed	<i>Chrysanthemoides monilifera</i>
	Chinese Pennisetum	<i>Cenchrus purpurascens</i>
	Climbing Asparagus	<i>Asparagus scandens</i>
	Gambusia	<i>Gambusia affinis</i>
	Koi Carp	<i>Cyprinus carpio</i>
	Nassella Tussock	<i>Nassella trichotoma</i>
	Old Man's Beard (Golden Bay, Kaiteriteri and Upper Buller Catchment)	<i>Clematis vitalba</i>
	Perch	<i>Perca fluviatilis</i>
	Purple Loosestrife	<i>Lythrum salicaria</i>
	Reed Canary Grass	<i>Phalaris arundinacea</i>
	Reed Sweet Grass	<i>Glyceria maxima</i>
	Rooks	<i>Corvus frugilegus</i>
	Rudd	<i>Scardinius erythrophthalmus</i>
	Tench	<i>Tinca tinca</i>
	Variagated Thistle	<i>Silybum marianum</i>
White-edged Nightshade	<i>Solanum marginatum</i>	
Wild Ginger (Golden Bay to Kaiteriteri)	<i>Hedychium gardnerianum and H flavescens</i>	

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Pest Designation	Common Name	Scientific Name
Containment Pests	Argentine Ants	<i>Linepithema humile</i>
	Australian Magpie	<i>Gymnorhina tibicen</i>
	Broom (Howard - St Arnaud)	<i>Cytisus scoparius</i>
	Brushtail Possum	<i>Trichosurus vulpecula</i>
	Darwin's Ants	<i>Doleromyrma darwiniana</i>
	Feral Cats	<i>Felis catus</i>
	Feral Rabbits and Hares	<i>Oryctolagus cuniculus, Lepus europaeus</i>
	Gorse (Howard - St Arnaud)	<i>Ulex europaeus</i>
	Lagarosiphon	<i>Lagarosiphon major</i>
	Mustelids – Ferrets, Stoats and Weasels	<i>Mustela furo, M erminea, M nivalis vulgaris</i>
Purple Pampas	<i>Cortaderia jubata</i>	
Boundary Control Pests	Australian Sedge	<i>Carex longebrachiata</i>
	Blackberry	<i>Rubus fruticosus agg</i>
	Broom (outside Howard - St Arnaud)	<i>Cytisus scoparius</i>
	Buddleia	<i>Buddleja davidii</i>
	Codling Moth, Black Spot, and Powdery Mildew	<i>Cydia pomonella, Venturia inaequalis, Podosphaera leucotricha</i>
	European Canker	<i>Neonectria ditissima</i>
	Fireblight	<i>Erwinia amylovora</i>
	Giant Buttercup	<i>Ranunculus acris</i>
	Gorse (outside Howard - St Arnaud)	<i>Ulex europaeus</i>
	Nodding Thistle	<i>Carduus nutans</i>
	Ragwort	<i>Senecio jacobaea</i>
Regional Surveillance Pests	Parrot's Feather	<i>Myriophyllum aquaticum</i>
	Pinus contorta	<i>Pinus contorta</i>
	Undaria	<i>Undaria Pinnatifida</i>
	Yellow Flag	<i>Iris pseudacorus</i>

## Appendix 10: Community proposals for reserve extensions Kingsland forest

